ORDNANCE MEMORANDA, No. 15.

REPORT

OF

THE BOARD OF OFFICERS

APPOINTED IN PURSUANCE OF

THE ACT OF CONGRESS APPROVED JUNE 6, 1872,

FOR THE PURPOSE OF

SELECTING A BREECH-SYSTEM FOR THE MUSKETS AND CARBINES OF THE MILITARY SERVICE, TOGETHER WITH THEIR REPORT UPON THE SUBJECT OF TROWEL-BAYONETS;

WITH AN

APPENDIX, PREPARED BY THE RECORDER, GIVING A DESCRIPTION OF EACH OF THE INVENTIONS SUBMITTED, WITH A CLASSIFIED NOMENCLATURE OF PARTS AS EXHIBITED IN THE DETAILED ILLUSTRATIONS ACCOMPANYING;

TO WHICH IS ADDED

THE REPORT OF A BOARD OF ORDNANCE OFFICERS

ON THE SUBJECT OF

THE PROPER CALIBER FOR SMALL-ARMS.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1873.

ERRATA.

Page.	Line.	For	Read
7	19	B. S. Roberts,	Gen. B. S. Roberts.
8	31	J. M. Milbank,	I. M. Milbank.
9	37	Springfield with lug,	Springfield, cal. 45, with lug.
10	3		James Stillman's plan.
10	5		James Stillman's plan.
10	27	excepted,	excerpted.
12	12	Remington Navy Rifle,	Remington Navy Rifle, No. 85.
18	20	1 minute, threw up,	1 minute, they threw up.
19		Diagrams incorrect.	
30	1	submitting,	transmitting.
31	14	Crispin, Ordnance,	Crispin, Ord. Dept.
35	9	for minutes,	for 2 minutes.
35	9	for 5 minutes,	for 2 minutes.
38	26	Morgenstern for,	Morgenstern arms for.
39	38	Monday morning at,	Monday at.
49	45	Rifle No. 83,	Rifle No. 82.
52	26	Monday morning at,	Monday at.
66	20	burning,	blowing.
68	28	punch,	pinch.
68	35	of before mentioned,	before mentioned of.
77	4	copper-cap,	copper-cup.
91	2	above,	about.
244	32	throw up,	throw it up.
258	5	bears,	bear.
258	6	forces,	force.
264	9	In withdrawing the bolt, etc.,	Omit paragraph.
272	3	loaded;	loaded; closed;
281	Legend	SIX *metallic parts,*	FIVE *metallic parts.*
	"	34 Ejector,	
	"	SEVEN *screws:*	EIGHT *screws:*
	"		35 Friction Spring Screw.
	"	35 Friction Spring,	34 Ejector Spring.
284	12	ejector cam,	extractor cam.
293	7	89	99
326	12	of the frame upon its back,	of its back upon the frame.

REPORT

OF THE

BOARD FOR SELECTING A BREECH-SYSTEM FOR THE MUSKETS AND CARBINES OF THE MILITARY SERVICE.

[EXTRACT.]

AN ACT making appropriations for the support of the Army for the year ending June thirty, eighteen hundred and seventy-three, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and the same are hereby, appropriated out of any moneys in the Treasury not otherwise appropriated, for the support of the Army for the year ending June thirtieth, eighteen hundred and seventy-three:

* * * * * * *

For manufacture of arms at the national armory, one hundred and fifty thousand dollars: *Provided,* That no part of this appropriation shall be expended until a breech-loading system for muskets and carbines shall have been adopted for the military service upon the recommendation of the board to be appointed by the Secretary of War, which board shall consist of not less than five officers, as follows: one general officer, one ordnance officer, and three officers of the line, one to be taken from the cavalry, one from the infantry, and one from the artillery: *And provided further,* That the system, when so adopted, shall be the only one to be used by the Ordnance Department in the manufacture of muskets and carbines for the military service; and no royalty shall be paid by the Government of the United States for the use of said patent to any of its officers or employés, or for any patent in which said officers or employés may be directly or indirectly interested.

* * * * * * *

Approved June 6, 1872.

Gen. I. G. Ingry

OFFICE OF BOARD ON BREECH-LOADING SMALL-ARMS,
New York, May 5, 1873.

SIR: I have the honor to inclose herewith the report of the Board for selecting a breech-loading system for muskets and carbines.

The accompanying documents referred to will be ready for transmission in about ten days or two weeks.

Very respectfully, your obedient servant,

ALFRED H. TERRY,
Brigadier-General and President of the Board.

The Hon. the SECRETARY OF WAR,
(*Through the Adjutant-General of the Army,*)
Washington, D. C.

(Indorsement.)

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, May 17, 1873.

Respectfully referred to the Chief of Ordnance.

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

REPORT.

OFFICE OF THE BOARD FOR SELECTING A
BREECH-SYSTEM FOR MUSKETS AND CARBINES,
New York, May 5, 1873.

PREAMBLE.

The Board have the honor to report that, having met on the 3d day of September, 1872, in pursuance of General Orders No. 58, Adjutant-General's Office, Washington, D. C., series 1872, they have continued in session until the present day, with the exception of such adjournments as were required by the necessities or delays of exhibitors, or by the Board for the accomplishment at the Springfield Armory of certain work which was necessary for the complete consideration of the questions involved.

DOCKET.

The following arms and models of arms, and of their parts, were received and entered on the docket as follows:

LIST OF ARMS.

No. 1.	Wooden model	Edwin Sleeper.
2.	Musket, cal. .50	B. S. Roberts.
3.	Carbine	W. T. Scott.
4.	Magazine-carbine	W. R. Evans.
5.	Musket, cal. .50	Sharps' Rifle Company.
6.	Wooden model	F. W. Worrell.
7.	Musket, cal. .50	Peabody Rifle Company.
8.	Musket, cal. .433	Do.
9.	Carbine, cal. .50	Do.
10.	Musket, cal. .50	E. Whitney.
11.	Musket, cal. .50	Do.
12.	Musket, cal. .50	Do.
13.	Musket, cal. .50	Do.
14.	Musket, cal. .42	J. D. Greene.
15.	Carbine, cal. .42	William Morgenstern.
16.	Musket	Frederick Wohlgemuth.
17.	Musket	Do.
18.	Musket, cal. .50	John Broughton.

No. 19. Musket, cal. .50 ..... E. Remington & Sons.
20. Musket, cal. .50 ..... Do.
21. Musket, cal. .50 ..... Do.
22. Musket, cal. .50 ..... Do.
23. Musket, cal. .50 ..... Do.
24. Musket, cal. .50 ..... W. H. Elliot.
25. Musket, cal. .50 ..... A. T. Freeman.
26. Musket, cal. .50 ..... Ward-Burton.
27. Carbine, cal. .50 ..... Do.
28. Carbine, cal. .50 ..... B. S. Roberts.
30. Musket, cal. .50 ..... C. M. Spencer.
31. Musket, cal. .50 ..... E. Remington & Sons.
32. Musket, cal. .50 ..... W. S. Smoot.
33. Musket, cal. .50 ..... Oscar Snell.
34. Musket, cal. .42 ..... S. F. Van Choate.
35. Musket, cal. .52 ..... W. H. Robertson.
36. Musket, cal. .50 ..... Capt. J. M. Whittemore.
37. Musket, cal. .50 ..... John L. Kirk.
38. Musket, cal. .50 ..... Smith & Chamberlain.
40. Musket, cal. .50 ..... B. F. Joslyn.
41. Musket, cal. .43 ..... E. Remington & Sons.
42. Musket, cal. .50 ..... Updegraff.
43. Musket, cal. .50, (Ryder extractor) ..... E. Remington & Sons.
44. Musket, cal. .50 ..... James F. Thomas.
45. Musket, cal. .50 ..... John Broughton.
46. Musket, cal. .42 ..... Westley Richards.
47. Musket, cal. .50 ..... Schofield-Remington.
48. Musket, cal. .50 ..... Springfield, mod. 1870.
48½ Carbine, cal. .50 ..... Springfield.
49. Wooden model ..... Alfred Beals.
50. Musket, cal. .50 ..... J. M. Milbank.
51. Musket, cal. .50 ..... Do.
52. Magazine-musket, cal. .44 ..... Stetson.
53. Musket, cal. .50 ..... James Lee.
54. Musket, cal. .50 ..... Do.
55. Wooden model ..... G. R. Remington.
56. Revolving carbine ..... Helm.
57. Musket, cal. .42 ..... Berdan-Russian.
58. Magazine-carbine, cal. .45 ..... Ward-Burton.
59. Musket, cal. .50 ..... A. T. Freeman.
60. Musket, cal. .58 ..... Mont-Storm.
61. Musket, cal. .50 ..... James Lee.
62. Musket, cal. .50 ..... Oscar Snell.
63. Musket, cal. .50 ..... Peabody.
64. Musket, cal. .50 ..... B. S. Roberts.
65. Musket, cal. .50 ..... Earnest.

No. 66. Musket, cal. .50 ..... Springfield-Stillman.
67. Musket, cal. .50 ..... Remington-Ryder.
68. Musket, cal. .50 ..... Springfield-Allin.
69. Musket, cal. .50 ..... Springfield.
73. Carbine, cal. .50 ..... Springfield.
74. Wooden model ..... J. B. Rumsey.
75. Carbine, cal. .50 ..... B. S. Roberts.
76. Musket, cal. .50 ..... A. T. Freeman.
77. Carbine, cal. .50 ..... E. Whitney.
78. Repeating musket, cal. .45 ..... Winchester.
79. Musket, cal. .42 ..... John Broughton.
80. Carbine, cal. .50 ..... W. H. Elliot.
81. Musket, cal. .50 ..... Sharps' Rifle Company.
82. Locking rifle, cal. .50 ..... Remington.
83. Musket, cal. .50 ..... Merrill.
84. Musket, cal. .50 ..... William Conroy.
85. Navy rifle, cal. .50 ..... Remington.
86. Musket, (Ryder extractor,) cal. .45 ..... Remington.
87. Magazine-musket, cal. .42 ..... William Gardner.
88. Musket, cal. .45 ..... Springfield.
97. Magazine-musket, cal. .45 ..... Ward-Burton.
99. Musket, cal. .45 ..... Springfield.

LIST OF TROWEL-BAYONETS AND PARTS.

No. 29. Trowel-bayonets ..... Lieut. E. Rice.
39. Bayonet-handles ..... F. Chillingworth.
70. Do. ..... Ira Merrill.
71. Stacking device, (upper band) ..... Do.
72. Improved side-lock ..... Do.

And also the following attachments, which, though not strictly belonging to any one system of breech-loading fire-arms, were in many cases so intimately related to a special arm as to call not only for their consideration in that connection, but also to admit other similar inventions of more general application to a no less extended regard.

DETACHABLE MAGAZINES, ETC.

No. 89. Springfield, cal. .45, with fixed magazine on side of stock. Colonel Benton's plan.
90. Springfield with lug on lock-plate for detachable magazine. Colonel Benton's plan.
91. Springfield, cal. .50, with altered lower band, and stop-pin for temporary detachable magazine. Lieutenant Metcalfe's plan.
92. Springfield, cal. .45, with fixed magazine. General Hagner's plan.
93. R. T. Hare's detached-magazine block.

No. 94. Ira Merrill's fixed magazine.
95. Springfield butt-stock bored to receive four cartridges; closed by lid swinging upward.
96. Springfield butt-stock bored to receive four cartridges; closed by lid swinging sideways.
98. Springfield, cal. .45, with altered lower band and stop-pin for temporary detachable magazine. Lieutenant Metcalfe's plan.
100. Elliot's cartridge-box.

FOREIGN ARMS.

Various foreign arms examined by the Board:

Chassepot;
Needle-gun;
Needle-gun, improved;
Needle-carbine;
Mauser;
Werndl;
Werder;
Vetterlin;
Martini-Henry.

It will be seen that the Board have examined and tried, as far as their facilities in the way of ammunition would permit, all the principal foreign systems of modern date.

TROWEL-BAYONETS.

The question of trowel-bayonets was referred to the Board by an indorsement of the Secretary of War, dated July 27, 1872, and as such formed the subject of a special report, the necessary record and correspondence being excepted from the general report of the Board.

After the arms at first presented in New York had reached a number large enough to be satisfactorily dealt with, the Board adjourned to Springfield Armory to pursue there the experimental tests which they should determine to apply to such systems among those submitted as might be deemed suitable for the military service.

REGULAR TESTS—CHARACTER.

These tests involving the susceptibility of the arms to the shock of repeated firing and to the injurious effects of dust, rust, and defective ammunition, were planned also to measure, in some degree, their reserve strength and facility of manipulation, this last quality being most easily gauged by comparing the extreme rapidity of fire of which the different systems were capable.

AMMUNITION.

In order to assimilate as closely as possible to the actual conditions of practice, except for such exhibitions of the utmost power of the arms

as might be desired by their representatives, the service .50 cal.-musket-cartridge was employed whenever possible, experience having shown that the character of the ammunition might affect very closely the performance of an arm in which it should be tried. The Board was confirmed in this view by the excellent qualities of the ammunition supplied for their experiments, only four or five cartridges in the 20,000 to 25,000 expended in regular firing missing fire, from causes not due to the arm in which they were tried.

PRESENCE OF EXHIBITORS.

For the sake of obtaining the utmost information on the subject of their research, the presence, under proper restrictions, of the representatives of arms was permitted and encouraged.

All the firings into which entered the question of dexterity were conducted by one individual, an employé of the National Armory.

SUPPLEMENTARY TESTS.

At the conclusion of these tests the list of competing arms was read over, and each member of the Board permitted to select from among them such arms as he might desire to have exposed to a second series of tests of the same general character as the first, but differing in the increased severity of their application.

LIST OF ARMS FOR SUPPLEMENTARY TESTS.

The arms so selected were 21 in number, viz:

Peabody, No. 63;
Whitney carbine, No. 77;
Springfield-Stillman, No. 66;
Elliot carbine, No. 80;
Ward-Burton magazine carbine, No. 58;
Updegraff, No. 42;
Sharps', No. 5;
Springfield, No. 69;
Remington-Ryder, No. 67;
Berdan-Russian, No. 57;
Freeman, No. 76;
Dexter, No. 38;
Lee, No. 61;
Roberts, No. 2, (repaired;)
Remington locking rifle, No. 82;
Winchester, No. 78;
Broughton, No. 79;
Sharps, No. 81;
Remington navy rifle, No. 85;

Including the following foreign arms:

Martini-Henry;
Werndl.

REPORT OF CALIBER BOARD.

The report of the Board of Ordnance Officers for the determination of a proper caliber for small-arms, appointed by Special Orders No. 107, Adjutant-General's Office, series of 1872, having by this time been referred to this Board, from among those of the 21 arms above mentioned, which had satisfactorily endured the supplementary tests, the Board selected the following six, viz:

ARMS ALTERED TO CAL. .45.

Springfield, No. 69;
Elliot, No. 80;
Ward-Burton magazine carbine, No. 58;
Remington navy rifle, when supplied with the Ryder power extractor;
Freeman, No. 76;
Peabody, No. 63;
which they requested the commanding officer of the National Armory to adapt to the barrel and ammunition recommended by the caliber Board.

FINAL TEST WITH .45 CAL. ARMS—CONCLUSION—SELECTION—RECOMMENDATION OF SPRINGFIELD SYSTEM.

These arms having been received, with the exception of the fourth on the list, for which the Remingtons supplied a substantially similar arm of their own make, No. 86, they were tested for rapidity of firing by the expert, and also by a party of old soldiers and recruits. Without particularizing the special favorable and unfavorable features of each system, fully shown by other portions of the record, the Board has been brought to the conclusion, from their own experiments, as well as from the great mass of confirmatory testimony obtained from the Army in the field, that the Springfield gun, No. 99, of all those presented, is the best suited for our military service. They have, therefore,

Resolved, That the Board recommend that the Springfield breech-loading system be adopted for the military service of the United States, in accordance with the provisions of the act of Congress entitled "An act making appropriations for the support of the Army for the year ending June thirty, eighteen hundred and seventy-three, and for other purposes," approved June 6, 1872.

RECOMMENDATION OF ELLIOT SYSTEM.

In further accordance with the favorable impressions produced by the trials of these last selected arms, the board feel it their duty to make the recommendations embodied in the following resolutions, viz:

Whereas the Elliot system has exhibited remarkable facility of manipulation in requiring but one hand to work it, and therefore rendering it especially adapted to the mounted service: Therefore, be it

Resolved, That it be recommended that a limited number of carbines be made after this system for issue to the mounted service, for trial in the field.

VALUE OF MAGAZINE-ARMS.

It was further

Resolved, That, in the opinion of the Board, the adoption of magazine-guns for the military service, by all nations, is only a question of time; that whenever an arm shall be devised which shall be as effective, as a single breech-loader, as the best of the existing single breech-loading arms, and at the same time shall possess a safe and easily manipulated magazine, every consideration of public policy will require its adoption.

MERITS OF WARD-BURTON MAGAZINE ARM AND CARTRIDGE—RECOMMENDATION OF WARD-BURTON MAGAZINE-ARM.

Resolved further, That the experiments before the Board with the magazine-carbine, made upon the Ward-Burton system at the Springfield Armory and using the Metcalfe cartridge, have so impressed the Board with the merits of this gun that they consider it as more nearly fulfilling the conditions above specified than any other magazine-gun tried by them or of which they have any knowledge. Therefore, while unwilling to recommend the immediate adoption of this system in face of the unanimous reports from the Army against the Ward-Burton single loader, it does recommend that a small number of magazine-muskets be made on this plan for further trial in the field.

ADDENDA.

Accompanying the report will be found the following documents:

I. The daily record of proceedings and adjournments.

II. The journal of experiments, of which a transcript has been made in the form of a synopsis, giving with each arm the result of its trial under each of the classes of tests.

III. A condensed tabular statement of the reports from the field, from which are drawn—

  A. An abstract of preferences.

  B. A statement of the principal essential parts broken in service, and of the proportionate miss-fires in the different arms.

IV. An appendix prepared by the recorder, giving a description of each of the inventions submitted, and intended to accompany a classified nomenclature of the parts shown in the photographic views with which it is understood that the report is to be illustrated.

V. The report of the Board for determining a suitable caliber for breech-loading small-arms, referred to this Board for its consideration and

action in connection with the adoption of a breech-loading system for small-arms, by an indorsement of the Secretary of War, dated February 8, 1873.

VI. Various correspondence and documentary exhibits.

ALFRED H. TERRY,
Brigadier-General.
P. V. HAGNER,
Colonel of Ordnance.
H. B. CLITZ,
Colonel Tenth Infantry.
M. A. RENO,
Major Seventh Cavalry.
L. L. LIVINGSTON,
Captain Third Artillery.

HENRY METCALFE,
Second Lieutenant of Ordnance and Recorder.

ADJOURNMENT.

There being no further business before the Board it adjourned *sine die.*

ALFRED H. TERRY,
Brigadier-General and President of the Board.

HENRY METCALFE,
Second Lieutenant of Ordnance and Recorder.

[Indorsement.]

ORDNANCE OFFICE, WAR DEPARTMENT,
Washington, May 19, 1873.

Respectfully returned to the Secretary of War, with the recommendation that the recommendation of the Board that the Springfield breech-loading system be adopted for the military service be approved, and that .45-inch caliber be adopted for all small-arms.

The law of June 6, 1872, expressly provides that the system adopted "shall be the only one to be used by the Ordnance Department in the manufacture of muskets and carbines for the military service." Should, therefore, the Springfield system be adopted as recommended, the law prohibits the manufacture of the Ward-Burton magazine and the Elliot gun for trial, as recommended by the Board. Were it not for this prohibition the trial of these guns in the field would be recommended.

A. B. DYER,
Chief of Ordnance, United States Army.

Approved.

WM. W. BELKNAP,
Secretary of War.

MAY 20, 1873.

REPORT ON THE SUBJECT OF TROWEL-BAYONETS.

REPORT.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
NATIONAL ARMORY,
Springfield, Massachusetts, February 4, 1873.

SIR: Herewith I have the honor to forward the record, with accompanying documents and photographs, of the Board for the selection of a breech-system for muskets and carbines, so far as it concerns the special subject of the trowel-bayonets referred to it by your indorsement of July 27, 1872.

Very respectfully, your obedient servant,

ALFRED H. TERRY,
Brigadier-General.

The Hon. the SECRETARY OF WAR,
(*Through the Adjutant-General United States Army.*)

The Board for the selection of a breech-system for muskets and carbines, appointed by General Orders No. 58, Adjutant-General's Office, series 1872, to which was referred the special subject of trowel-bayonets by an indorsement of the Secretary of War, July 27, 1872, has the honor to present the following record of its proceedings:

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 4, 1872.

Present: All the members and the recorder.

A letter was received from Lieutenant Rice, asking when it would be convenient for him to present his trowel-bayonet, to which a reply was sent.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 9, 1872.

Present: General Terry, Colonel Hagner, Major Reno, Captain Livingston, and the recorder.

Absent: Colonel Clitz.

A letter was received from the Chief of Ordnance submitting papers on the trowel-bayonet with indorsements by the Secretary of War.

The Board directed that Lieutenant Rice should be informed, in answer to his letter of the 22d ultimo, that the Board was now ready to consider his invention, authority to that effect having been received.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 24, 1872.

Present: All the members and the recorder.

Lieutenant Rice presented samples of trowel-bayonets, which were examined by the board.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 10, 1872.

Present: Colonel Hagner, Colonel Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry.

The Board experimented with Lieutenant Rice's trowel-bayonet.

Three men, laborers, after some instruction by Lieutenant Rice, in 4 minutes 30 seconds threw up an embankment 20 inches high, 30 inches wide at the base and about 8 inches wide on top, and 5½ feet long, from an area of ground 5½ feet by 6½ feet, and 5 inches deep, which concealed them from observation at a distance of 10 yards when they lay down close to the ground.

With shovels.—The same men, each with a shovel, in 1 minute 45 seconds threw up an embankment of the same length and somewhat greater thickness and height. Working by reliefs of about 1 minute, threw up a similar embankment in 3 minutes 10 seconds. The soil was a very loose turf overlying a light sand.

As might have been expected from their usual occupation, the men did not complain of the shank of the bayonet blistering their hands.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 11, 1872.

Present: Colonel Hagner, Colonel Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry.

Lieutenant Rice presented specimens of the Merrill handle for bayonets.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 16, 1872.

Present: General Terry, Colonel Hagner, Colonel Clitz, and the recorder.

Absent: Major Reno and Captain Livingston.

Mr. Chillingworth presented samples of trowel and triangular bayonets fitted with his improved handle.

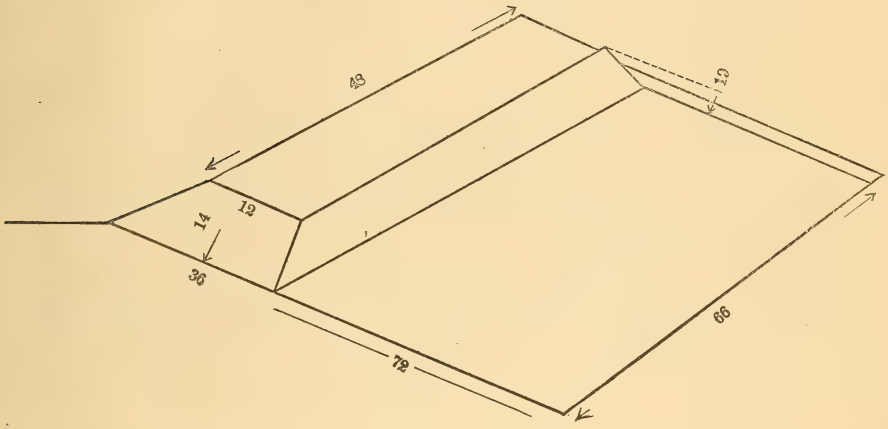
OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 17, 1872.

Present: All the members and the recorder.

Lieutenant Rice submitted letters from officers of the Army concerning his trowel-bayonet, which were read before the Board.

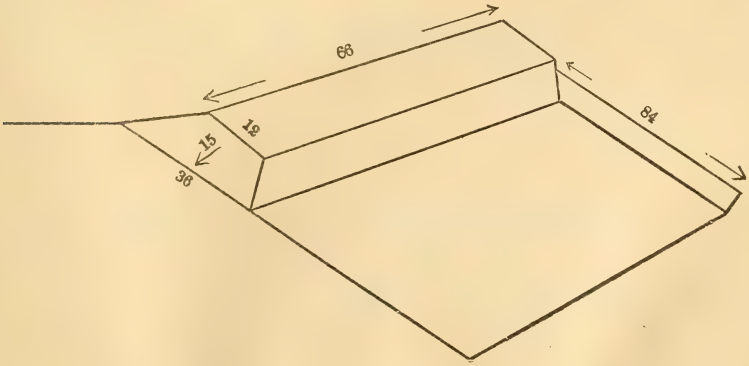
The Board proceeded to further trial of the trowel-bayonet fitted with the Chillingworth handle.

The same three men, equipped with trowel-bayonets, having their sockets filled with wooden plugs, working in a pasture the ground of which was a well-packed turf overlying a sandy subsoil thickly seamed with roots, in 4 minutes threw up an embankment of the following general dimensions:



This did not completely conceal them lying down at a distance of 10 yards.

The same men working in a similar place, but free from roots, in 2 minutes 45 seconds threw up an embankment:



The bayonet fixed on a gun-barrel was then tried as a digging-tool, but was shown to be far less manageable than when detached as in ordinary use.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 21, 1872.

Present: Colonel Hagner, Colonel Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry.

The question of voting on the trowel-bayonet was then discussed, and it was decided to postpone a final decision until after the arrival of General Terry.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 25, 1872.

Present: Colonel Hagner, Colonel Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry.

The board examined the Chillingworth bayonet-handle, designed to prevent loss of parts.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, November 20, 1872.

Present: All the members and the recorder.

The Board—

Resolved, That the Chillingworth bayonet-shank be subjected to the rusting process which is applied to the arms before the Board, and then examined to determine whether it can be easily fixed and unfixed.

The question of the adoption of the trowel-bayonet was discussed by the Board.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, November 22, 1872.

Present: All the members and the recorder.

After exposure to rusting, the Chillingworth bayonet-handle worked freely.

The following opinions were then read and ordered to be incorporated with the record:

I think that the day of the bayonet has passed away. Just as the pike yielded to the muzzle-loading fire-arm with the bayonet, so this latter must yield to the breech-loading arm without the bayonet. While, however, this is my belief, I do not think it prudent to definitely abandon the weapon until actual experience in war shall demonstrate that it is no longer of use. The same improvements in fire-arms which render the bayonet useless make an intrenching-tool for each man a necessity; but they also call for increased mobility of troops, and to this end render it necessary that the weight of the soldier's equipment shall be diminished rather than increased. If, then, an intrenching-tool be added to the equipment, something else should be taken from it. I think there is no part of it which can be so well spared as the bayonet, and notwithstanding my opinion that prudence requires that the bayonet should be retained until experience shall demonstrate that it is valueless, if it were necessary to dispense with it in order that an intrenching-tool might be carried, I should advocate its abandonment.

The trowel-bayonet, however, if it be efficient in both capacities, spares us the necessity of making a choice between the two. I frankly confess that when it was first presented to the Board I thought it, as an intrenching-tool, a mere toy; but the experiments with it which we have seen have convinced me that in this respect it is exceedingly efficient. I am satisfied that troops provided with it can completely shelter themselves from musketry fire in a very few minutes; so shelter themselves that, with good breech-loading arms, their position will be nearly impregnable. As a bayonet, while it is not suited to practice in the fencing-schools, it will, I think, be as efficient as any weapon of the kind in the rough thrusting of actual conflict.

I cannot attach much importance to the principal objection urged against its adoption, that its use will detract from the military appearance of troops, (we are in search of the useful, not the beautiful;) and it can and always should be worn sheathed, never fixed except it be needed as a bayonet in action, should such a contingency occur.

In order, then, that without sensibly increasing the weight of the soldier's equipment he may carry both a bayonet and an intrenching-tool, I vote to recommend the adoption of Rice's trowel-bayonet with the Chillingworth handle.

ALFRED H. TERRY,
Brigadier-General.

Colonel Hagner desires to state, in explanation of his vote, that he does not consider it advisable or necessary to attach a tool of this description to the rifle-musket.

As the most important and costly article of the soldier's equipment, the gun requires constant care to keep it in good order, and particularly to protect it from the slightest injury affecting its accuracy; hence, to use it for any purpose *by authority*, increasing the risk to such injuries, does not seem to be proper unless *decidedly necessary*.

The use for which the trowel is intended must soon injure its appearance, and make it unsuitable to be attached to a well-kept rifle-gun; hence, if the soldier is authorized to subject this part to rough usage he will be apt to be less careful of other parts of the arm.

As no advantage is claimed in the use, either of trowel or gun, from the incongruous combination, it seems that the above consideration should outweigh the slight inconvenience of increasing by a few ounces the soldier's load. Hence, Colonel Hagner would recommend the use of a suitable *earth-trowel*, with a wooden handle, to be carried attached to the valise of the infantry soldier, and to retain for the gun a bayonet of the present universally approved pattern, but reduced in length of blade to about 12 inches, as the present length is no longer deemed necessary.

P. V. HAGNER,
Colonel of Ordnance.

The trial of Rice's trowel-bayonet before the Board has convinced me of the great value of a light intrenching-tool in the hands of each soldier, but I am not at all satisfied that we should not spoil the bayonet and adopt an inferior intrenching-tool by trying to combine the two. I should much prefer to recommend that the present triangular bayonet be retained, and a light steel intrenching-tool, with wooden handle and of an approved pattern, be issued to each enlisted man of infantry, artillery, and engineers, as part of his equipment. I therefore vote against the adoption of Rice's trowel-bayonet.

H. B. CLITZ,
Colonel Tenth Infantry.

The experiments made with the trowel-bayonet before the Board, under the supervision of Lieutenant Rice, the inventor, show conclusively its great value as a means of providing men with cover promptly, an indispensable condition when the accuracy and range of the armaments of the present day are considered. It is surely as effective as an offensive weapon as the old one.

No other objections than an unsightly appearance, the possible chance of the soldier bending his gun-barrel, and the inability to stack arms, can be urged against it. The first is too trivial to consider; the second is proved by experiment to be unfounded, as the bayonet works better in the hand than on the gun, (see Record,) and the third is easily obviated by a simple device of Mr. Merrill, to attach a small iron hook to the upper band of each gun, to be hooked into the swivels of the two remaining guns necessary to complete the stack; but in any event, in my opinion, its value as a means of providing shelter in a short space of time outweighs the objections.

I am not in favor of adding weight to what the soldier already carries, as is proposed by attaching a trowel to the knapsack, as the necessity for increased mobility of troops, if possible, is well recognized. A

majority of officers, under whose supervision this bayonet has been tested, agree in giving it a decided preference. I vote for the adoption of the bayonet.

M. A. RENO,
Major Seventh Cavalry, member.

I strongly recommend the adoption of Rice's trowel-bayonet for the use of the Army, to substitute the bayonet now in use.

L. L. LIVINGSTON,
Captain Third Artillery.

The following resolution was then passed:

Resolved, That the Board recommend to the War Department that Rice's trowel-bayonet, with the Chillingworth attachment, be adopted for the use of the military service.

ALFRED H. TERRY,
Brigadier-General.
P. V. HAGNER,
Colonel of Ordnance.
H. B. CLITZ,
Colonel Tenth Infantry.
M. A. RENO,
Major Seventh Cavalry.
L. L. LIVINGSTON,
Captain Third Artillery.

HENRY METCALFE,
Second Lieutenant Ordnance, Recorder.

[First indorsement.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, February 7, 1873.

Respectfully submitted to the Secretary of War.

E. D. TOWNSEND,
Adjutant-General.

[Second indorsement.]

ORDNANCE OFFICE, *March* 6, 1873.

Respectfully returned to the Secretary of War, with the recommendation that 10,000 of these trowel-bayonets be made and issued to the troops for trial. They should be fully tested, and the results reported to this Bureau. It is further recommended that an equal number of intrenching-tools be made, to be carried by the soldiers, and be tried in comparison with the trowel-bayonet.

To prevent any possibility of the use of the trowel-bayonet for intrenching purposes, when *fixed*, instructions should be given that the trowel-bayonet shall be worn habitually in the scabbard, and only be fixed when emergency necessitates its use as a weapon.

By order of the Chief of Ordnance:

S. V. BENÉT,
Major of Ordnance.

Approved by the Secretary of War March 7, 1873.

H. T. CROSBY,
Chief Clerk.

I.

RECORD OF PROCEEDINGS AND ADJOURNMENTS

OF THE

BOARD FOR SELECTING A BREECH-SYSTEM

FOR THE

MUSKETS AND CARBINES OF THE MILITARY SERVICE,

APPOINTED BY

GENERAL ORDERS No. 58, ADJUTANT-GENERAL'S OFFICE, SERIES OF 1872.

RECORD.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
National Armory, Springfield, Massachusetts, May 10, 1873.

SIR: I have the honor to transmit herewith, by express, the addenda I, II, and V, referred to in the report of the Board for the selection of a breech-loading system for muskets and carbines, and in the letter accompanying the report, dated May 5, 1873. The other addenda will be forwarded as rapidly as they can be prepared.

Very respectfully, your obedient servant,

HENRY METCALFE,
Lieutenant of Ordnance, Recorder.

The Hon. the SECRETARY OF WAR,
(*Through the Adjutant-General United States Army,*)
Washington, D. C.

Proceedings of a Board for the examination of small-arms, convened at New York, September 3, 1872, *by authority of the following order:*

[General Orders No. 58.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, June 28, 1872.

The following is an extract from section 1 of the "act making appropriations for the support of the Army for the year ending June 30, 1873, and for other purposes," approved June 6, 1872:

"For manufacture of arms at the national armory, one hundred and fifty thousand dollars: *Provided,* That no part of this appropriation shall be expended until a breech-loading system for muskets and carbines shall have been adopted for the military service, upon the recommendation of the board to be appointed by the Secretary of War, which board shall consist of not less than five officers, as follows: One general officer, one ordnance officer, and three officers of the line, one to be taken from the cavalry, one from the infantry, and one from the artillery: *And provided further,* That the system, when so adopted, shall be the only one to be used by the Ordnance Department in the manufacture of muskets and carbines for the military service; and no royalty shall be paid by the Government of the United States for the use of said patent to any of its officers or employés, or for any patent in which said officers or employés may be directly or indirectly interested."

In conformity with the above provisions, a board will assemble in the city of New York, on the 3d day of September, 1872, with authority to adjourn to Springfield Armory, in order to avail itself of the resources of that establishment, which are hereby placed at its disposal, to consider and recommend for adoption a breech-loading system for muskets and carbines for the military service.

Detail for the board.—Brigadier-General A. H. Terry, United States Army; Colonel P. V. Hagner, Ordnance Department; Colonel H. B. Clitz, Tenth Infantry; Major M. A. Reno, Seventh Cavalry; Captain L. L. Livingston, Third Artillery.

Second Lieutenant Henry Metcalfe, Ordnance Department, is detailed as recorder of the board.

All persons interested in small-arms are invited to submit samples and appear in person, under such rules as may be adopted by the board.

The Ordnance Bureau will supply such information bearing on the matters under investigation as may be called for by the board.

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

Official:
WM. D. WHIPPLE,
Assistant Adjutant-General.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 3, 1872.

The Board met pursuant to the above order.

Present: Colonel Hagner, Colonel Clitz, Major Reno, Captain Livingston, and the recorder.

The senior member present having received a telegram from General Terry stating his inability, from having missed railroad connections, to be present to-day, the Board adjourned until to-morrow, the 4th instant, at 11 a. m.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 4, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Communications from Messrs. A. M. McWhorter, G. D. Luce, W. R. Evans, S. F. Van Choate, General M. C. Meigs, and Lieutenant E. Rice, received by General Terry before the meeting of the Board, and unanswered by him, were then presented and read. Awaiting further action by the Board they were filed unanswered, except that a reply was sent to that received from Lieutenant Rice.

The recorder submitted a correspondence with Messrs. T. Poultney, Oscar Snell, and E. Sleeper, presenting in behalf of the latter a wooden model, with specifications, which were filed.

The Board applied to the Chief of Ordnance for reports on breech-loading small-arms from the field and from the boards of which Generals Hancock and Schofield were presidents, together with such other ordnance memoranda as detail proceedings of boards on small-arms or parts of small-arms.

A petition from Messrs. W. G. Ward, E. Remington, and others, that the board conduct its experiments at Creedmoor, Long Island, was received and placed on file.

The Board adopted the following notice, which was ordered to be published, regulating the reception of samples and communications, and appointed its hours of sitting, daily, from 10 a. m. to 3 p. m.

OFFICE OF THE BOARD ON SMALL-ARMS, FOURTH STORY, ARMY BUILDING,
Corner of Houston and Greene Streets, September 4, 1872.

Notice is hereby given to all persons who desire to submit samples, or to appear in person before the Board, that it is now in session at the above-named office.

All written communications will be addressed to the recorder of the Board, and samples of arms will be received at the board-rooms between the hours of 10 and 3, daily, until further notice.

HENRY METCALFE,
Second Lieutenant Ordnance, Recorder.

Mr. J. W. SIMONTON,
Agent Associated Press, present.

There being no further business the board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 5, 1872.

The board met pursuant to adjournment.

Present: All the members and the recorder.

The following rule was adopted for the reception of guns:

Upon receipt of the gun let the inventor explain it, take it apart, distribute parts to members for examination, and *when upon request* assemble it, and show general mechanical movements and advantages claimed; then leave the gun for the Board.

And also the following general tests for the arms presented for examination:

BEFORE FIRING—

1st. Examine the mechanical construction, facility and rapidity of dismounting and re-assembling.
2d. Facility of loading and extracting shells.
3d. Effect of dust in impeding the mechanism.
4th. Effect of water and consequent rust on mechanism.

AFTER THE ABOVE—

5th. Rapidity of fire, at will and from the shoulder.
6th. Accuracy of fire, at will and from the shoulder.
7th. Effect of dust and rust upon rapidity and accuracy.
8th. Effect of defective ammunition.
9th. Effect of overcharges and firing with dirty bore.
10th. Number of parts, simplicity in assembling, and liability of detached parts to loss and breakage.
Also such other tests by firing and exposure as the Board may desire to apply.

The notice intended for publication in the morning papers, which, from want of time, had to be intrusted to the courtesy of the press, having failed to appear, and no arms being ready for examination, the Board adjourned.

OFFICE OF BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 6, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board directed a request to be made of the Chief of Ordnance for a description of the breech-loading small-arms made or altered at the National Armory within the past few years.

General B. S. Roberts presented a breech-loading musket of his invention, which was examined by the Board. The lock was found to contain 8 pieces, and the movable parts of the system to include 5 others. (The latter were assembled in 44 seconds and stripped in 55 seconds.)

Mr. W. R. Evans presented a magazine-carbine, for holding 38 cartridges; it was charged in 60 seconds, the magazine emptied in 15 seconds, and 38 shots fired in 27 seconds. The gun was removed by the inventor to be replaced by another of different caliber.

The Board decided upon a form to be filled up by persons presenting samples for its examination; when, having no further specimens of arms before it, it adjourned till Monday, the 9th instant, at 11 a. m.

OFFICE OF BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 9, 1872.

The Board met pursuant to adjournment.

Present: General Terry, Colonel Hagner, Major Reno, Captain Livingston, and the recorder.

Absent: Colonel Clitz.

Mr. G. W. Yale, on behalf of the Sharps Rifle Manufacturing Company, presented a breech-loading rifle, which was dismounted and discussed by the Board.

Letters were received from the Chief of Ordnance submitting papers on the trowel-bayonet, with indorsements by the Secretary of War, inclosing a descriptive compilation asked for September 6, with a table of changes in the Springfield musket; and inclosing letters from Messrs. C. B. Norton, Thos. C. Johnston, E. Whitney, M. F. Benton, Wilhelm Bessler, and Quartermaster-General Meigs. Letters were also received from Messrs. J. L. Kirk and F. W. Worrell, the latter being accompanied by a wooden model, all of which were placed on file.

The Board directed answers to be sent to Messrs. J. L. Kirk, and M. F. Benton, and that Lieutenant Rice be informed, in answer to his letter of the 22d ultimo, that the Board was now ready to consider his invention, authority to that effect having been received.

Having no other specimens of arms before it the Board then adjourned.

OFFICE OF BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 10, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Letters from Messrs. Oscar Snell, M. F. Benton, and E. Whitney, the last two transmitting specimens of arms, were read, and a reply ordered sent to Mr. Snell.

The following resolution was adopted, which was ordered to be communicated by the president to the National Rifle Association:

Resolved, That the president be requested to return the thanks of the Board to the officers of the National Rifle Association, who have been kind enough to offer us the use of their target-grounds in the neighborhood of this city, and to inform them that, in the opinion of the Board, it will be more convenient and advantageous for the performance of the duties assigned to them to make use of the ground and conveniences already prepared for them at the Springfield Armory.

Mr. Whitney presented four Whitney rifles, and Mr. J. D. Greene one rifle, which were examined and discussed by the Board.

Having no other specimens of arms before it, the Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 11, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Letters were received from the Chief of Ordnance, transmitting documents asked for September 4, and from Lieutenant-Colonel B. S. Roberts, and the Boyd Breech-Loading Arms Company, to which answers were ordered to be sent.

The Peabody and Wohlgemuth guns were examined and discussed.

There being no other arms present for examination, the Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 12, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The following resolution was adopted:

Resolved, That when this Board adjourns at the close of its session on the 27th instant, it will adjourn to meet in Springfield, Massachusetts, on the 7th of October.

Which was directed to be communicated to Colonel F. M. Peck, with a view to its insertion in the daily papers.

There being no guns before it for examination, the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 13, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Broughton, Whitney, and Scott guns were examined and discussed, as were also specimens of the Martini-Henry, Chassepot, Mauser, Werndl, Wanzel, Snider, and Vetterli arms, presented through the courtesy of Colonel Crispin, Ordnance, to the attention of the Board.

There being no guns before it for examination the Board adjourned till Monday, the 16th instant, at 10 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 16, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

No guns being presented for examination, the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 17, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Five specimens of the Remington gun and one Elliot gun were presented by the owners, and examined by the Board.

There being no other guns before it for examination, the Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 18, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

There being no specimens of arms before it for examination, the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 19, 1872.

The Board met pursuant to adjourument.

Present: All the members and the recorder.

At the request of Mr. Whitney, the Board permitted his model of cal. .43, and entered on the docket as gun No. 12, to be taken away by him.

O. F. Winchester, Esq., exhibited his breech-loading and magazine rifle, which was partly examined and returned to him.

A. T. Freeman presented his breech-loading rifle, known as the Freeman rifle, which he dismounted, re-assembled, and explained to the Board, leaving it with them for experiment.

General W. G. Ward presented samples of the Ward-Burton rifle and carbine, which he dismounted and left with the Board for experiment.

General B. S. Roberts also presented a breech-loading carbine as above.

There being no other arms for examination, the Board adjourned, to to meet at 11 a. m. to-morrow.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 20, 1872.

The Board met pursuant to adjournment.

Present: General Terry, Colonel Hagner, Colonel Clitz, Major Reno, Captain Livingston.

Absent: The recorder, by permission of the Board.

The Board received from the Union Metallic Cartridge Company a sample card, the receipt of which was acknowledged by mail.

The Board then adjourned to meet on Monday next, the 23d instant, at 11 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 23, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board examined the changes made in the Broughton gun to prevent its discharge at half-cock. It reconsidered its resolution of the 12th instant, and changed the day of meeting in Springfield from the 7th to the 9th proximo.

There being no guns before it for examination, the Board then adjourned till to-morrow at 11 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 24, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

First Lieutenant E. Rice, Fifth United States Infantry, presented samples of trowel-bayonets, which were examined and considered by the Board.

There being no other arms before it for examination, the Board adjourned till 10 a. m. to-morrow.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 25, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Specimens of arms were presented by Messrs. C. M. Spencer, E. Remington & Sons, W. S. Smoot, and William Morgenstern, and were examined and discussed by the Board; when, having no other specimens of arms before it, the Board adjourned till to-morrow at 10 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 26, 1872.

The Board met pursuant to adjournment.

Present: Colonels Hagner and Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry, by permission of the Board.

No specimens of arms being presented for examination, the Board adjourned till to-morrow at 10 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, September 27, 1872.

The Board met pursuant to adjournment.

Present: Colonels Hagner and Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry, by permission of the Board.

In conformity with the authority given in General Orders No. 58, current series, Adjutant-General's Office, Washington, D. C., the Board then adjourned to meet at Springfield Armory, October 10, 1872.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, October 10, 1872.

The Board met pursuant to adjournment.

Present: Colonels Hagner and Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry.

A telegram was received from General Terry stating his necessary detention on official business.

The Board then proceeded to discuss and make a few preliminary experiments with the Evans repeating rifle and with Lieutenant Rice's trowel-bayonet, when, having no other specimens of arms before it, the Board adjourned to meet to-morrow at 10 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 11, 1872.

The Board met pursuant to adjournment.

Present: Colonels Hagner and Clitz, Captain Livingston, and the recorder.

Absent: General Terry, detained in his command by important public business, and Major Reno, by permission of the Board.

Messrs. Snell, Robertson, Van Choate, and Captain J. M. Whittemore presented samples of arms, which were examined and discussed.

Messrs. Snell and Evans removed their specimens for replacement by more perfect models.

Lieutenant Rice, United States Army, presented specimens of the Merrill handle for bayonets.

The Board adjourned to meet October 16 at 10 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 16, 1872.

The Board met pursuant to adjournment.

Present: General Terry, Colonels Hagner and Clitz, and the recorder.

Absent: Major Reno and Captain Livingston.

Mr. Chillingworth presented samples of trowel and triangular bayonets fitted with his handle, and Messrs. Smith and Chamberlain presented a specimen of their arm, known as the "Dexter" gun; these were examined and discussed by the Board.

Captain J. M. Whittemore withdrew his sample from competition.

The Board then adjourned till to-morrow at 10 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 17, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Lieutenant E. Rice submitted letters from officers of the Army concerning his trowel-bayonet, which were read before the Board.

Mr. B. F. Joslyn submitted the Joslyn-Tomes gun, which was examined and discussed.

The Board then discussed a series of rules for the trial of arms before it, and proceeded to further trial of the trowel-bayonet fitted with Chillingworth's handles.

The Board then adjourned till to-morrow at 10 o'clock.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 18, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board discussed and adopted the following rules:

TESTS FOR A GUN WHICH THE BOARD HAVE DECIDED TO SUBJECT TO TRIAL.

The piece to be first fired ten rounds by the exhibitor, or with a lanyard, as a test of safety.

The firing to be then continued according to the rules annexed, by an employé of the Armory, or soldier detailed by the War Department. The record to be based upon this firing, though exhibitors may have the privilege of displaying the powers of their guns if desired, and of having their performance noted in the record.

The service-cartridge to be used in all cases where the gun is chambered for it, except in the special trials made by exhibitors.

No persons will be admitted to the firing ground but the agents or exhibitors of the gun immediately under trial, and such other persons as may be specially invited by the Board.

TESTS.

I. *Rapidity with aim.*—The number of shots which, fired in one minute, strike a target 6 feet by 2 feet at a distance of 100 feet. Any cartridges missing fire in this or other tests to be tried with a prick-punch, or opened to ascertain the cause of failure. The test to be begun with an empty chamber or magazine, the cartridges to be disposed at will on a table.

II. *Rapidity at will.*—The number of shots that can be fired in one minute, irrespective of aim.

III. *Endurance.*—Erch gun to be fired 500 continuous rounds, without cleaning. The state of the breech-mechanism to be examined at the end of every 50 rounds.

IV. *Defective cartridges.*—Each gun to be fired once with each of the following defective cartridges: 1. Cross-filed on head to nearly the thickness of the metal. 2. Cut at intervals around the rim. 3. With a longitudinal cut the whole length of the cartridge from the rim up. A fresh piece of white paper marked with the number of the gun being laid over the breech to observe the escape of gas, if any occurs.

V. *Dust.*—The piece to be exposed in a box prepared for that purpose to a blast of fine sand-dust for minutes; to be removed, fired 50 rounds, replaced for 5 minutes, removed and fired 50 rounds more.

VI. *Rust.*—The breech mechanism and receiver to be cleansed of grease and the chamber of the barrel greased and plugged, the butt of the gun to be inserted to the height of the chamber in brine for 10 minutes, exposed for two days to the open air standing in a rack, and then fired 50 rounds.

VII. *Excessive charges.*—To be fired once with 85 grains of powder and one ball of 450 grains of lead; once with 90 grains and one ball; and once with 90 grains and two balls. The piece to be closely examined after each discharge.

And decided to test the following guns among those submitted for its action:

Nos. 2 and 28. Roberts;
No. 4. Evans;
No. 5. Sharps;
Nos. 7, 8, and 9. Peabody;
Nos. 10, 11, 12 and 13. Whitney;
No. 14. Greene;
No. 15. Morgenstern;
No. 18. Broughton;
Nos. 19, 20, 21, 22 and 23. Remington;
No. 24. Elliot;
No. 25. Freeman;
Nos. 26 and 27. Ward-Burton;
No. 30. Spencer;
No. 31. Remington bolt-gun;
No. 32. Smoot;
No. 34. Van Choate;
No. 35. Robertson;
No. 38. Dexter;
No. 40. Joslyn-Tomes.

It was decided not to test the following arms:

No. 1. Sleeper;
No. 3. Scott; (to be set aside.)
No. 6. Worrell;
Nos. 16 and 17. Wohlgemuth;
No. 33. Snell, which was withdrawn;
No. 36. Whittemore, withdrawn;
No. 37. Kirk.

The Board then adopted the following hours for its sessions, viz: 9 a. m. to 12½ p. m., 2½ p. m. to 4½ p. m., and directed that there should be sent to the agents of the Sharps', Whitney, and Roberts' guns copies of their rules, with an intimation of their readiness to test their guns on Tuesday next, the 22d instant, and that the Peabody gun be tried on Monday, the 28th instant.

The Board then agreed to the following resolution:

Resolved, That the commanding officer of the Armory be requested to submit to the Board, for experiment, samples of the breech-loading muskets and carbines of the patterns made at Springfield and now in use in the field, and referred to in the reports from company commanders

now before the Board; also such other models of breech-loading arms as have been made at the Armory and have been subjected to trial.

The Board then requested Major Benton, commanding, to provide them with the services of a clerk.

The Board then adjourned till Monday next.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 21, 1872.

The Board met pursuant to adjournment.

Present: Colonels Hagner and Clitz, Major Reno, Captain Livingston, and the recorder.

A telegram was received from the Secretary of War, authorizing the absence of General Terry, and directing the Board to proceed without him.

The question of voting on the trowel-bayonet was then discussed, and it was decided to postpone a final decision until the arrival of General Terry.

The Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 22, 1872.

The Board met pursuant to adjournment.

Present: Colonels Hagner and Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry.

The Board proceeded to the test of the Sharps' rifle, with the results noted in the journal.

The Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 23, 1872.

The Board met pursuant to adjournment.

Present: Colonels Hagner and Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry.

The Board then proceeded to the test of the Sharps' and Roberts' rifles, and agreed to substitute for "brine," in Test VI, the words "a solution of sal-ammoniac;" and also to forbid the handling of guns by their representatives at any time after the preliminary test for safety.

The Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 24, 1872.

The Board met pursuant to adjournment.

Present: Colonels Hagner and Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry.

The Board decided to make Test IV on the present list No. I, and to let the other tests follow in their present order, substituting for "50 rounds" in Tests V and VI, "20 rounds" in each case.

It was decided to refuse the application of General Roberts, whose gun broke in firing yesterday, to have it restocked for a continuation of the trial.

The trial of the Dexter gun was then gone on with, after which the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 25, 1872.

The Board met pursuant to adjournment.

Present: Colonels Hagner and Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry.

The Board examined a wooden model of an improvement on the Springfield musket, model 1870, presented by the master armorer, Mr. E. S. Allin, and decided to request permission of the Secretary of War to have a working model made here for trial.

It examined an improvement of the Chillingworth bayonet-handle, designed to prevent loss of parts.

The trial of the Remington muskets was set for Monday next, the 28th instant.

The Board then proceeded with the trial of the Sharps' rifle; after which it adjourned till Monday next, at 9 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 28, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

The Board then proceeded to complete the trial of the Dexter gun, and to the test of the Peabody musket, and of the two Remington arms, numbered on the docket 19 and 20.

The Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 29, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

The Board proceeded to the trial of the Peabody musket and of the Remington muskets 19, 20, 21, 22, 23.

The Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 30, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

On the application of Lieutenant Colonel B. S. Roberts, United States Army, (retired,) the Board granted him permission to withdraw his musket disabled October 23, and to substitute for it a carbine of the same general design.

The Board then proceeded to the trial of the Remington muskets numbered 21 and 23, the Spanish model (Remington) No. 41, and the Smoot musket.

The Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, October 31, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

The application of Lieutenant-Colonel B. S. Roberts to have his broken gun restocked at the public expense was refused, and the trial of the Broughton gun set for Tuesday, November 12.

The Board then proceeded to the trial of the Smoot and Peabody muskets, and of the Remington arms Nos. 19, 20, and 41; after which it directed the trial of the Smoot arm and Remington 21 and 41 arms on the 11th proximo, and set the trial of the Broughton, Greene, Remington, and Morgenstern for on or after Tuesday, the 12th proximo.

Having then completed all the business ready for its action, and having been notified that those called upon desired to be excused from attending during the coming week, the Board adjourned till Monday, the 11th proximo, at 2.30 p. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, November 11, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

The Board examined the Updegraff arm, and proceeded to the trial of the Remington 21 and 41, and the Smoot gun; after which it adjourned

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OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, November 12, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and the recorder, who was absent by permission of the Board.

The Remington gun No. 23 was authorized to be withdrawn to be fitted with a dog-spring, in the place of one broken October 30. Owing

to lack of transportation to the water-shops, it was decided to defer Tests II, III, and V till a more convenient occasion.

The Board proceeded to test the Remington 22 and 43, the Thomas gun, the Broughton 18 and 45, and the Updegraff gun, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, November 13, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

The Board adopted the following rule:

After the rusting test the guns may be cleaned in the shop; prior to that no one should clean them but the employé. The only cleaning requisite during the experiments, and prior to rusting, is to oil and wipe the breech-mechanism, and wipe out the barrel. No cleaning or wiping should be done during the experiments, unless in the presence of the Board, or by special direction.

And proceeded with the trial of the arms known as the Thomas, Remington 22 and 43, Morgenstern, Broughton 18 and 45, and Updegraff, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, November 14, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

It set the trial of the Whitney arms for Tuesday next, November 19, and proceeded to the trial of the arms known as the Updegraff, Broughton 18 and 45, Greene, Thomas, and Remington 43; after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, November 15, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

It set the trial of the Ward-Burton arms for Tuesday next, and of the Joslyn-Tomes for Wednesday next.

It then proceeded with the trial of the arms known as the Greene, the Remington 22 and 43, the Thomas, the Updegraff, the Broughton 18 and 45, after which it adjourned till Monday morning at 9 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, November 18, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry and Colonel Hagner, and present the recorder.

The Board proceeded to test the arms known as the Remington 22 and 43, the Thomas, Broughton 18 and 45, the Updegraff, and the Greene, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, November 19, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder; and proceeded to test the Whitney arms 11 and 13, the Spencer, and the Robertson.

Mr. Robertson was allowed to withdraw his arm for the purpose of altering it to fire the United States service ammunition.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, November 20, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

It went on with the test of the Spencer and Whitney arms 11 and 13.

It was resolved, That the Westley Richards arm being, in the opinion of the Board, of a model unsuitable for military service, it be not subjected to trial, and that the Greene, Thomas, and Remington No. 23 arms having failed to withstand the tests to which it was decided to subject all guns, the Board is of opinion that these models of guns are not suitable for military service.

It was further resolved, That the Chillingworth bayonet-shank be subjected to the rusting process which is applied to the arms before the Board, and then examined to determine whether it can be easily fixed and unfixed.

The question of the adoption of the trowel-bayonet was discussed by the Board, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, November 21, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder, and proceeded with the trial of the Springfield, Joslyn-Tomes, and Schofield's improved Remington arms, the trial of the last two of which was temporarily postponed, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, November 22, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder, and proceeded with the trial of the Spencer and Whitney arms Nos. 11 and 13.

It was resolved, That the Board recommend to the War Department

that Rice's trowel-bayonet with the Chillingworth attachment be adopted for the use of the military service.

It was further resolved, That all persons whose arms have been before the Board and have not been tested, be notified to be present here December 3d next.

After which the Board adjourned to meet December 2 at 2½ p. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 2, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board proceeded to test the Springfield and Van Choate arms, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 3, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

The Board proceeded to test the Ward-Burton and Van Choate arms, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 4, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

The Board proceeded to test the arms known as Milbank 50 and 51, and Stetson, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 5, 1872.

The Board met pursuant to adjournment.

Present: Colonels Hagner and Clitz, Major Reno, and the recorder.

Absent: General Terry and Captain Livingston.

The Barnekov-Greene gun was exhibited by Mr. Greene, and discussed by the Board.

This arm, the Stetson magazine-gun, the Milbank bolt-gun, were decided by the Board as being of models unsuited for the military service, and were consequently set aside for consideration by the full Board.

Mr. Milbank and Mr. Lee withdrew their bolt-guns presented and partly tested yesterday.

The Board then proceeded with the test of the Lee, Robertson, Freeman, and Milbank arms, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 6, 1872.

The Board met pursuant to adjournment.

Present: Colonel Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry, on public business, and Colonel Hagner, who was called away by a death in his family.

The Board proceeded to try the Ward-Burton, the Elliot, the Freeman, the Robertson, and the Lee arms, after which it adjourned till Monday, the 9th instant.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 9, 1872.

The Board met pursuant to adjournment.

Present: Colonel Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry and Colonel Hagner.

The trial of the Elliot and Freeman arms was continued; after which the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 10, 1872.

The Board met pursuant to adjournment.

Present: Colonel Clitz, Major Reno, Captain Livingston, and the recorder.

Absent: General Terry and Colonel Hagner.

The Board examined the Miller carbine presented by Mr. Helm, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 11, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

The Board examined the Miller carbine, and decided that, on account of its manifest unsuitability for the military service, it be set aside for consideration by the full Board, after which it adjourned until December 13.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 13, 1872.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

The tests of the Freeman gun were completed; after which the Board adjourned till Monday, 16th instant.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 16, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Allin modification of the Springfield musket, and a model devised by Mr. James Stillman, were examined and discussed by the Board, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 17, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

They examined the Mont-Storm system, and a magazine-carbine and other models on the Ward-Burton plan, and continued the trial of the Allin modification of the Springfield and the Russian-Berdan gun.

Mr. Muir, agent of the Mont-Storm gun, withdrew the model to change it to .50 caliber.

It was resolved, 1st. That when the Board adjourn on Friday next it be until Monday January 6; 2d. That the commanding officer of the Armory be requested to prepare for the Board a working-model on the plan recently presented to the board by Mr. James Stillman, master stocker; 3d. That notwithstanding the existing crack in the chamber of the Allin gun, the tests be continued with it in its present condition.

The Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 18, 1872.

The Board met pursuant to adjournment.

Present: All the members, and present the recorder.

Action in the matter of the Stillman gun was postponed until further experiments had been made with the plan proposed by Mr. Allin.

The cartridges for the Ward-Burton magazine-arm not being ready, its trial was fixed for Tuesday, January 7.

Permission was refused Mr. Allin to withdraw his gun and re-enter it with a perfect barrel until after its exposure to the rusting test.

The Board then proceeded to the trial of the Peabody and Ward-Burton arms, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 19, 1872.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Under authority from the Secretary of War, Mr. Whipple, agent of the Ward-Burton arm, was allowed to examine the reports from the field concerning that system.

The Board examined a carbine on the Elliot principle, which was withdrawn for alteration, allowed General Roberts a postponement of the trial of his gun until after their next meeting, and proceeded to test the Lee guns Nos. 54 and 61, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, December 20, 1872.

The Board met pursuant to adjournment.

Present: All the members, and present the recorder.

Mr. Allin was allowed to replace his barrel by a new one; and it was ordered, owing to the insufficient deposit of rust on his arm, that it should be exposed to the test a second time.

It was resolved, That the commanding officer of the Armory be requested to prepare, during the recess of the Board, a working-model of a gun on the plan submitted by Mr. James Stillman, master stocker.

After having completed the test of the Russian-Berdan arm, the Board adjourned till January 6, at 2½ p. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 6, 1873.

The Board met pursuant to adjournment.

Present: Major Reno and the recorder, the rest of the Board being detained by the snow.

The Board then adjourned until to-morrow.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 7, 1873.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

The Board appointed the 9th instant for the trial of the new Remington-Ryder arm, and proceeded to test the Joslyn-Tomes and Roberts arms, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 8, 1873.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

Mr. Conroy, of New York, presented a wooden model of an arm, and Mr. Funk, agent of the Earnest gun, submitted a sample of that arm, which were examined and discussed by the Board.

After testing the Joslyn-Tomes and Earnest guns the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 9, 1873.

The Board met pursuant to adjournment.

Present: All the members except General Terry, and present the recorder.

Mr. Gardner presented a model of his magazine-gun, adapted for sporting purposes, which was examined and discussed by the board.

The agent of the Remington arm having failed to keep the appointment made the 7th instant, the Board, after fixing Monday next for the trial of the Whitney carbine, adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 10, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board examined the alteration of the Springfield musket devised by Mr. Stillman, and a Remington-Ryder musket submitted by Mr. Ryder.

In consequence of the danger of accident to a number of ice-cutters just in range of the target, after completing the tests of the Lee No. 61 and Joslyn-Tomes arms, the Board adjourned till Monday next at 9½ a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 13, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board proceeded to test the Allin and Stillman modifications of the Springfield arm, the Remington-Ryder system No. 67, the Lee arm, No. 54, and the Roberts arm, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 14, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

It was resolved, That the Snell arm being, in the opinion of the Board, of a model unsuitable for the military service, it be not subjected to further trial.

The Board proceeded to the further test of the Joslyn-Tomes arm, after which it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 15, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Mr. Burgess exhibited a repeating carbine, cal. .44, which was examined by the Board. Owing to the insufficiency of the charge, no experiments were made with it, but Mr. Burgess left with the intention of making a model for a larger cartridge as soon as informed of the adoption of the pattern now under consideration by the Government.

After testing the Robertson arm the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 16, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board discussed the question of selecting from those arms previously tried such systems as seem worthy of further experiment.

Mr. Lee exhibited the details of working and construction of his guns Nos. 54 and 61.

After completing the tests on the Remington-Ryder No. 67, Springfield with Stillman lock, Lee No. 54, and Roberts arms, the Board adjourned till 9.30 a. m., January 21.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 21, 1873.

The Board met pursuant to adjournment.

Present: All the members except Captain Livingston, and present the recorder.

An application from General Ward to postpone the trial of the Ward-Burton magazine-arm until February 4 was granted.

Mr. Muir, agent of the Mont-Storm arm, appearing with the same piece (cal. .58) presented December 17, and withdrawn for change to the service caliber, and stating that he had making a new arm of the proper dimensions, was informed that if his new arm should be ready in time for trial by the Board it would be tested, but that if it should not be presented in time notice would be given him of the approaching adjournment in season for the submission of the present arm.

The Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 22, 1873.

The Board met pursuant to adjournment.

Present: All the members except Colonel Clitz and Captain Livingston, who were detained by sickness, and present the recorder.

There being no business before the Board it adjourned until Tuesday, 28th instant, at 9.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 28, 1873.

The Board met pursuant to adjournment.

Present: All the members except Captain Livingston, and present the recorder.

The Board discussed the lock submitted by Mr. Merrill, and after further testing Mr. Milbank's bolt-gun No. 51, it adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 29, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Mr. Milbank dismounted and explained his gun partly tested yesterday.

The Board also examined the construction of the Earnest gun submitted by Mr. Funk.

After reading and approving the report of the Board on the trowel-bayonet, and declining the proposal made by the agent of the Snell gun January 16, concerning the testing of that arm, and at the request of the agent of the Earnest gun postponing its trial till to-morrow, the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 30, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

After the trial of the Earnest gun, which was withdrawn by the agent, the following resolution was adopted:

Resolved, That notice be given in both Springfield papers that the Board will act upon all guns presented before the 15th day of February, and that from and after that time the Board will devote itself to making up its report.

The following tests were adopted for the trial of such arms as might be reserved for further experiments:

1st. To be fired with two defective cartridges Nos. 1 and 2, and then to be dusted five minutes, the mechanism being in the mouth of the blow-pipe and closed, the hammer being at half-cock; then to be fired 6 shots, the last two defective Nos. 1 and 2, then without cleaning to be dusted with the breech open and fired 4 shots. The piece to be freed from dust only by pounding or wiping with the bare hand.

2d. To be rusted for 4 days after immersion as before and then fired 5 rounds with the service-cartridge; then without cleaning to be fired 5 rounds with 120 grains powder and a ball weighing 1,200 grains; the gun to stand twenty-four hours after firing, without cleaning, and then to be thoroughly examined.

3d. Facility of manipulation by members of the Board.

An application from General B. S. Roberts desiring an interview with the Board to-morrow morning having been received and granted, the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, January 31, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

General Roberts appeared before the Board and exhibited a breech-loading carbine on his plan and made a statement of the general advantages of the system.

The following resolution was passed:

Resolved, That the commandant of the Armory be requested to supply a new stock for the gun of Brigadier-General B. S. Roberts, No. 2, to replace the one broken October 23 during the test applied to it.

The Board examined a model of a magazine-arm submitted by Mr. Rumsey, of Washington, D. C., after which it adjourned till Tuesday, February 4, at 9.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, February 4, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board appointed the 5th, 6th, and 18th instants, respectively, for the trial of the Elliot, Freeman, and Kirk guns; and after testing the Ward-Burton magazine-carbine the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, February 5, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board examined new models of the Elliot, Roberts, Whitney, and Freeman guns.

General W. G. Ward exhibited different arms on the Ward-Burton system.

After applying to the Secretary of War for the decision of the Board for determining a proper caliber for small-arms, and testing the Elliot, Freeman, and Whitney arms, the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, February 6, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board allowed Dr. Elliot and Mr. Freeman to remove their arms, Nos. 24 and 25, the former for the adaptation of a combined main and sear spring, to be returned in season for the rust-test on the 18th instant, and after further testing the Elliot and Freeman guns adjourned to meet Tuesday, the 18th instant, at 9.30 o'clock a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, February 18, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Mr. Gardner appeared, and on giving an explanation of the difficulties he had found in completing his arm, was allowed until the 28th instant to finish it.

It was decided to appoint the 25th instant for the trial of the Conroy arm.

Mr. Spier submitted an arm, which he afterwards withdrew.

The Board decided to subject the following arms to the severer tests adopted January 30:

Peabody, No. 64;
Whitney carbine, No. 77;
Springfield-Stillman;
Elliot carbine, No. 80;
Ward-Burton magazine;
Updegraff;

Sharps, No. 5;
Remington-Ryder, No. 67;
Springfield, No. 69; (thin plate.)
Berdan-Russian;
Freeman, No. 76;
Dexter;
Lee, No. 61;
Roberts musket, No. 2;
and also to rust Dr. Elliot's gun for two days.

The Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, February 19, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

After applying part of the regular tests to the Winchester No 78, and Broughton Nos. 45 and 79 arms, and also submitting the Sharps No. 81, Dexter No. 38, and Elliot No. 80 arms to the first of the supplementary tests, the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, February 20, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

It was resolved to subject the Remington locking-rifle, model 1872, and the Winchester and Broughton No. 79, to the supplementary tests, dispensing with those of a preliminary nature not yet endured.

It was also resolved to postpone the trial of the Conroy arm until the 26th instant.

After testing, under the ordinary rules, as far as Test V, the Broughton No. 79 and the Winchester arms, and according to the supplementary tests the Updegraff, Roberts No. 2, Ward-Burton magazine-carbine, Freeman No. 76, and Russian-Berdan arms, the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, February 21, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

It was resolved, That the Winchester and Sharps' Rifle Manufacturing Companies be notified of the breaking of the lever and lever springs of their guns on the 19th and 21st instants, respectively, that they might have an opportunity of replacing them if desired.

It was also resolved, That the Sharps' rifle No. 5 be subjected to the supplementary tests.

After subjecting the Broughton gun No. 45 to a second repetition of test No. VII, and exposing to the first supplementary test the Broughton No. 79, Remington-Ryder, Springfield No. 69, Remington locking-rifle No. 83, Springfield-Stillman, Peabody No. 63, Sharps' No. 5, Whitney No. 77, and Lee No. 61, to await the rusting of the arms, the Board adjourned till Wednesday, February 26.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, February 26, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

After subjecting to the second of the supplementary tests the

Elliot No. 80,
Remington-Ryder No. 67,
Remington locking-rifle No. 82,
Ward-Burton magazine-carbine,
Broughton No. 79,
Springfield No. 69,
Springfield-Stillman No. 66,
Lee No. 61,
Whitney carbine No. 77,
Peabody No. 63,
Roberts No. 2,
Sharps No. 5,
Russian-Berdan No. 57,
Freeman No. 76,
Updegraff No. 42, and
Dexter No. 38 arms,

and deciding to drop the Updegraff and Lee arms, the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, February 27, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

After examining the condition of the guns tested yesterday, and resolving to drop the Broughton No. 79 and Remington-Ryder No. 67 arms, and appointing to-morrow for the trial of the Merrill, Conroy, and Gardner arms, adding the Remington navy-rifle, and Remington rifle No. 19, with the Ryder power-extractor arms, to the list of those to be subjected to the supplementary tests, and selecting the Springfield No. 69, the Elliot No. 80, the Ward-Burton magazine-carbine, the Remington navy-rifle when supplied with the Ryder power-extractor, the Freeman No. 76, and Peabody No. 63 for adaptation to the barrel and ammunition recommended by the report of the Board for determining a proper caliber for small-arms, the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, February 28, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Messrs. Merrill and Conroy explained their arms to the Board. The latter was withdrawn by the owner; the former was partly tested under the regular tests and withdrawn for alteration by the owner, and the Martini, Werndl, Remington navy, and Winchester arms under the first of the supplementary tests. The Werndl and Winchester arms were dropped as being disabled by the rust.

It was resolved to apply to the commanding officer of the Armory for the alteration of the arms recommended yesterday for adaptation to the .45 cal. barrel.

The Board then adjourned until Tuesday next, 4th proximo, at 9.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Springfield, Massachusetts, March 4, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

It was resolved to transmit to the War Department the model of bayonet tested and recommended for adoption by the Board, in order to complete the record in connection with the subject of trowel-bayonets.

After examining the Martini and Remington No. 85 systems, after their exposure to rusting, and directing the recorder to request the commanding officer of the armory to prepare, during the recess of the Board, a suitable detachable magazine for the Springfield musket, or other single breech-loading small-arms, the Board adopted the following resolution:

Resolved, That the Board adjourn to meet in the city of New York when notified by the recorder that certain work ordered to be completed at the Armory is nearly ready for its examination, the Board to assemble in season for the preliminary trial of such arms as may be meanwhile submitted.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 1, 1873.

The Board met pursuant to the following call of the President:

ARMY AND NAVY CLUB,
New York, March 7, 1873.

SIR: I have learned from General Clitz the action of the Board in reference to its future meetings. After consultation with him, I have fixed upon Tuesday, the 1st day of April, as the time of its next meeting. Please notify the officers composing the Board of this time.

Very respectfully, your obedient servant,

ALFRED H. TERRY,
Brigadier-General and President of the Board.

Lieutenant HENRY METCALFE,
Recorder of Board on Small-arms.

Present: All the members and the recorder.

The Board examined the alterations of the Remington gun with Ryder extractor No. 86, the Elliot and Freeman guns, also Lieutenant Metcalfe's arrangement of a detachable magazine, submitted among others by Major Benton, according to the request from the Board contained in a letter to him dated March 4, 1873.

Mr. Conroy presented an alteration of his former gun, to which it was decided by the Board to apply no further tests.

The Board then adjourned till to-morrow at 10.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 2, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board examined plans of detachable magazines submitted by Major Benton, and referred to in his letter of the 31st ultimo.

The Board then adjourned until to-morrow at 10.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 3, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board examined the altered model of the Peabody arm, and also a modification of the pattern before submitted by Mr. Whitney.

The Board then adjourned until to-morrow at 10.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 4, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board proceeded to test for rapidity of fire, with aim, taking the cartridges from the table, the following-named arms altered to cal. .45: Elliot, Remington No. 86, Remington No. 85 with Ryder extractor, Freeman, Springfield, and Peabody, with the results given in the journal.

It was then resolved to inform Messrs. Remington, Elliot, and Freeman of the defects of manufacture discovered in their arms, and to request them to have them corrected and returned before Monday morning at 11 a. m., until which hour the Board then adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 7, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Mr. Gardner presented the altered model of his repeating gun adapted to the Russian-Berdan cartridge, which the Board examined and proceeded to test with the results given in the journal.

The Board discussed the question of the supplementary tests to be applied to the altered guns, and as a preliminary to further action—

Resolved, That the following telegram should be sent to the commanding officer of Springfield Armory:

Can you give the Board any further information as to the time when the Ward-Burton gun will be finished? Please send on one thousand (1,000) more cartridges of forty-five caliber.

After which the Board adjourned till to-morrow at 10.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 8, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board proceeded to the discussion of the rules governing the trial of the arms altered to cal. .45, and adopted the following rules for those tests regarding the rapidity of fire, viz:

That the comparative rapidity of fire of each gun shall be determined by taking the average time of five successive trials, which shall be made by the same individual, at intervals of 20 minutes, and which shall consist of firing, with aim, from service cartridge-box No. 2, suspended from the waist-belt, 24 cartridges of cal. .45. The guns to be tested at the rate of one each working day, and in the following order, determined by lot, viz:

No. 1. Elliot,
2. Peabody,
3. Springfield,
4. Remington,
5. Freeman,

and the alteration of the Ward-Burton magazine-gun when completed.

The Merrill gun was further examined since its alteration by the exhibitor, but being, in the opinion of the Board, of a model unsuitable for military service, was not subjected to further trial.

The Board then adjourned until to-morrow at 10.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 9, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Mr. Lee having appeared before the Board, and having requested a copy of that portion of the journal having reference to the trial of his gun, the Board decided not to make public any part of their record until its promulgation by the proper authorities.

On Mr. Lee's application the commanding officer of Springfield Armory was requested to return him the broken parts of his gun No. 61.

The Board proceeded to test, for rapidity, the Elliot gun, with the result given in the journal.

The Board then adjourned until to-morrow at 10.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 10, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

On the application of Messrs. Hill and Hare, employés of the Board, it was decided to request the commanding officer of Springfield Armory to increase their extra compensation to the sum of $2.50 per day, to take effect from March 29, the date of their arrival in New York on duty with the Board.

On the request of Mr. E. Whitney, that the Board should apply the

test with increased charges to a new model of his gun, it was decided that no particular test could be made of a gun which had not endured the trials of a preliminary nature, for which his application had not been made in time.

The alteration of the Peabody arm having been taken up for the test of rapid firing, it was found that the head of the firing-pin had been accidentally broken off; the arm was sent to the Peabody Arms Company for repair, and the alteration of the Springfield substituted in its place. After testing this arm, with the result given in the journal, the Board adjourned till Monday morning at 11 o'clock.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 14, 1873.

The Board met pursuant to adjournment.

Present: All the members except Colonel Hagner, and present the recorder.

After testing, for rapidity, the model of the .45 cal. Remington arm No. 86, with the results given in the journal, the Board adjourned till to-morrow at 10.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 15, 1873.

The Board met pursuant to adjournment.

Present: All the members except Colonel Clitz, and present the recorder.

After proceeding to the trial of the Freeman gun, with the results given in the journal, the Board adjourned till to-morrow at 10.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 16, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Mr. Muir presented a model of a gun, which was examined and discussed by the Board.

Mr. Whitney submitted his gun No. 77, altered by modifying the shape of the curve on the locking-brace, and the substitution of a friction-roll for the cam-lever, as well as by applying to it a barrel of cal. .45, to which he desired should be applied the usual supplementary tests.

After deciding to supply the place of the mainspring in the altered Springfield arm (cal. .45) by one of the standard weight of 75 pounds, that previously used having been inadvertently weakened in the manufacture to a weight of 65 pounds, (see Major Benton's letter of April 12, 1873,) and resolving to repeat to-day the test for rapidity with the arm, the Board adjourned, to await the repairing of the Peabody arm, and the completion of the Ward-Burton magazine-musket, until Monday next at 10.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 21, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

After testing the Peabody arm, with the results given in the journal, the Board adjourned until to-morrow at 10.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 22, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

After resolving to refuse the application made by Mr. Whitney on the 16th instant, and testing the Ward-Burton magazine-arm, with the results given in the journal, the Board adjourned until to-morrow at 10.30 a. m.

OFFICE BOARDN OBREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 23, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

After testing the Ward-Burton magazine-arm, Lieutenant Metcalfe's detachable magazine, and Dr. W. H. Elliot's magazine cartridge-box, with the results given in the journal, the Board resolved to try the arms for facility of manipulation by persons not experts.

The Board also resolved to meet to-morrow, at 11 a. m., at the Battery, in order to proceed thence to Fort Columbus and continue with the trial as above stated.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 24, 1873.

The Board met pursuant to adjournment.

Present: General Terry, Colonel Hagner, Major Reno, Captain Livingston.

Absent: Colonel Clitz, from sickness, and the recorder, by permission of the Board.

The Board proceeded to Fort Columbus, Governor's Island, New York Harbor, where a party of 10 enlisted men, 5 of them old soldiers and 5 new recruits, were placed at their disposal by the commanding officer.

After completing the tests, with the results given in the journal, the Board adjourned till to-morrow at 10.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 25, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

Resolved, To return Dr. Elliot's gun to him to afford him an opportunity of correcting the defect found in the ejecting apparatus yesterday.

Awaiting this correction the Board adjourned till Monday at 11 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 28, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board discussed the results of the preceding experiments, and resolved to apply to the War Department* for the following information, as follows:

The ADJUTANT-GENERAL OF THE ARMY, *Washington, D. C.:*

The first vote taken in the Board on Breech-Loading Small-Arms, after the conclusion of its experiments, develops great differences of opinion among the members of the Board. May the Board recommend two or three systems, and also recommend their trial in the field before final adoption?

By order of the Board:

ALFRED H. TERRY,
Brigadier-General.

After which, the Elliot gun not yet having been received, the Board adjourned until to-morrow at 10.30 a. m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 29, 1873.

The Board met pursuant to adjournment.

Present: General Terry, Colonel Hagner, Captain Livingston, and the recorder.

Absent: Colonel Clitz, from sickness, and Major Reno, by permission of the Board.

The Board received from Springfield Armory a Springfield musket, cal. .45, altered by Colonel Benton with the purpose of diminishing the difficulties found in the previous experiments for rapidity in entering the cartridge into the chamber in loading.

After experimenting with this arm, with the results noted in the journal, the Board adjourned.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, April 30, 1873.

The Board met pursuant to adjournment.

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*The following is the telegram of the Adjutant-General of the Army in reply to the above inquiry:

[Telegram.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, April 29, 1873.

In reply to yours of yesterday, the Acting Secretary of War does not wish to decide the question, as the Secretary will return in a few weeks. With the approbation of the former, and of General Sherman, I say the act contemplates one system, and guns can only be made after its adoption. New action by Congress and new appropriations will be necessary to permit previous trials in the field. If it is hard for the Board to agree, much harder would it be to get a decision from various reports of different officers in the field.

E. D. TOWNSEND,
Adjutant-General.

General A. H. TERRY,
President Board on Small-Arms, New York City.

Present: General Terry, Colonels Hagner and Clitz, Captain Livingston, and the recorder.

Absent: Major Reno, by permission of the Board.

After discussing the results of the experiments, the Board adjourned until to-morrow at 10.30 a-m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, May 1, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

After discussing the results of the previous experiments—

Resolved, That the Board recommend that the barrels of muskets and carbines be browned before issue to the troops.

The Board then adjourned until Saturday morning at 10 o'clock.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, May 3, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The Board proceeded to discuss the form in which their opinion should be expressed in their report.

After further testing in Springfield and Elliot arms, trying the former in connection with Lieutenant Metcalfe's cartridge-holder, and deciding not to consider the subject of detachable magazines, the Board adjourned until Monday next at 12 m.

OFFICE BOARD ON BREECH-LOADING SMALL-ARMS,
Army Building, New York City, May 5, 1873.

The Board met pursuant to adjournment.

Present: All the members and the recorder.

The results of firing the Elliot and Springfield arms by a party of soldiers at Governor's Island were examined and approved.

After reading and signing the fair copy of the report adopted, the Board adjourned *sine die*.

HENRY METCALFE,
Second Lieutenant Ordnance, Recorder.

II.

SYNOPSIS OF THE EXPERIMENTS

MADE BY THE

BOARD FOR SELECTING A BREECH-SYSTEM

FOR THE

MUSKETS AND CARBINES OF THE MILITARY SERVICE,

APPOINTED BY

GENERAL ORDERS NO. 58, ADJUTANT-GENERAL'S OFFICE, SERIES OF 1872.

I.—REGULAR SERIES OF TESTS:
a.—COMPLETED.
b.—INCOMPLETE.

II.—SUPPLEMENTARY SERIES.

III.—FINAL SERIES.

REGULAR TESTS.

SAFETY TEST: TO BE FIRED 10 ROUNDS BY THE EXHIBITOR, OR WITH A LANYARD.

I.—*Defective cartridges.*

Each gun to be fired once with each of the following defective cartridges: 1. Cross-filed on head to nearly the thickness of the metal. 2. Cut at intervals around the rim. 3. With a longitudinal cut the whole length of the cartridge from the rim up. A fresh piece of white paper marked with the number of the gun being laid over the breech to observe the escape of gas, if any occurs.

II.—*Rapidity with accuracy.*

The number of shots which, fired in one minute, strike a target 6 feet by 2 feet at a distance of 100 feet. Any cartridges missing fire in this or other tests to be tried with a prick-punch, or opened to ascertain the cause of failure. The test to be begun with an empty chamber or magazine, the cartridges to be disposed at will on a table.

III.—*Rapidity at will.*

The number of shots which can be fired in one minute, irrespective of aim.

IV.—*Endurance.*

Each gun to be fired 500 continuous rounds, without cleaning. The state of the breech mechanism to be examined at the end of every 50 rounds.

V.—*Dust.*

The piece to be exposed in the box prepared for that purpose to a blast of fine sand-dust for 2 minutes; to be removed, fired 20 rounds, replaced for 2 minutes, removed and fired 20 rounds more.

VI.—*Rust.*

The breech mechanism and receiver to be cleansed of grease and the chamber of the barrel greased and plugged, the butt of the gun to be inserted to the height of the chamber in a solution of sal-ammoniac for 10 minutes, exposed for two days to the open air standing in a rack, and then fired 20 rounds.

VII.—*Excessive charges.*

To be fired once with 85 grains of powder and one ball of 450 grains of lead; once with 90 grains and one ball; and once with 90 grains and two balls. The piece to be closely examined after each discharge.

SYNOPSIS.

I REGULAR SERIES OF TESTS—(*a*) COMPLETED.

SHARPS' RIFLE.

Using service-cartridges.

OCTOBER 22, 1872.

The safety-test was complied with.

I. No. 1. The paper was not soiled.
No. 2. Slight escape of gas above and below. Paper not torn.
No. 3. Strong escape of gas above and below. Paper not torn.

II. Twelve shots, 10 hits. Two shells extracted hard, the lever requiring a blow to start them; this was probably due to a slight deposit of rust in the chamber which had accumulated there since the presentation of the arm in New York.

III. Fifteen shots. One shell extracted hard. One cartridge was caught by slide in closing, but was inserted and fired. The thumb-nail of the operator was injured by catching in the lever while opening the breech. The lever-catch slipped forward occasionally and interfered with closing the breech.

IV. Four hundred rounds fired. The above trouble with the lever-catch found throughout the test.

OCTOBER 23, 1872.

Five hundred rounds were completed, the lever-catch giving the same inconvenience as above.

V. After the first exposure the breech opened very hard. Fifty rounds fired without failure.

OCTOBER 25, 1872.

After the second exposure the breech opened easily. Fifty rounds fired without failure.

VI. The gun, after dipping and exposure for forty-four hours, was found to be thoroughly rusted. The breech was opened with difficulty. Twenty shots were fired without failure. The lever required a sharp blow to extract the shells, the solution having slightly leaked into the chamber. After this was cleaned, the mechanism remaining rusty as before, one shot was fired and the shell extracted without the slightest difficulty.

VII. No. 1. Everything worked well.
No. 2. Same.
No. 3. Same.

The arm was then carefully examined and found uninjured in any of its parts.

OCTOBER 22, 1872.

Display.—To display the powers of the gun, Mr. Yale, the agent, fired 10 rounds with Martin's improved ammunition, manufactured by Sharps' Rifle Manufacturing Company; everything worked well.

Under test II, he fired 13 shots, 12 hits.

Under test III, he fired 15 shots.

The arm worked well throughout.

DEXTER GUN.

Using the service-cartridge.

OCTOBER 24, 1872.

The safety-test was complied with; worked well.

I. No. 1. Strong escape above and on sides. Paper torn.
No. 2. Same.
No. 3. Slight escape on right side near where the slit was placed.

II. Eleven shots, 11 hits. Three shells required a blow to extract them.

III. Eighteen shots.

IV. Five hundred rounds fired without failure. Three cartridges burst in the head without affecting the piece or injuring the person firing, whose hand was exposed. After 350 rounds it was found that the rear side-screw had worked out, and that the lock-plate projected a trifle. These parts were replaced, and remained in position afterward.

V. After first exposure the piece worked freely, and twenty rounds were fired. After second exposure, same.

OCTOBER 28, 1872.

VI. After exposure the arm was found not very badly rusted, owing in part to the protection afforded by blueing. It opened easily and worked freely during the firing of 20 rounds. One cartridge missed fire, failed under the prick-punch, was opened and was found to have contained an insufficient quantity of fulminate.

VII. The three charges were fired without trouble, except that in the last the cartridge-head blew off, the lever sticking slightly in opening.

REMINGTON, No. 19.

OCTOBER 28, 1872.

The safety-test complied with; worked well.

I. No. 1. Strong escape above and to the right. Paper slightly torn.
No. 2. Strong escape above and to the right.
No. 3. Slight escape above and to the right.

II. Thirteen shots, 12 hits. The ejector worked badly. The shells often had to be picked out with the fingers.

III. Nineteen shots. The ejector failing in many cases to throw out the shells.

IV. At first the ejector occasionally failed; it improved as the test went on till at the last it worked well. After the four-hundredth round it was discovered that the button-screw had worked loose. This was screwed home and retained its place afterward; otherwise everything worked well.

OCTOBER 29, 1872.

V. Worked freely throughout the test.

OCTOBER 31, 1872.

VI. One opened hard. Twenty rounds were fired, the hammer working hard throughout, the firer having to spit on the hammer to lubricate it.

VII. In opening the breech after the last shot, the hammer worked very hard; otherwise everything worked well.

REMINGTON, No. 20.

OCTOBER 28, 1872.

The safety-test complied with. Everything worked well.

I. No. 1. Escape of gas above.
No. 2. Escape of gas above.
No. 3. No escape of gas.

II. Fourteen shots, 11 hits. Ejector worked very badly.

III. Eighteen shots. The ejector worked very badly.

IV. The ejector frequently failed; otherwise the arm worked well. One cartridge burst in the head, but did no harm. Immediately after the last shell was withdrawn, which stuck very badly, a Martin cartridge was fired and ejected with the greatest ease.

V. Worked freely when empty, but extracted badly; otherwise worked well throughout the test.

OCTOBER 31, 1872.

VI. Worked easily; fired 20 rounds without any trouble.

VII. In opening the breech after the last shot, the hammer worked rather hard; otherwise everything worked well.

REMINGTON, No. 21.

OCTOBER 29, 1872.

The safety-test was complied with. Everything worked well.

I. No. 1. Strong escape above and to the front. Paper was torn.
No. 2. Escape of gas above.
No. 3. Slight escape above.

II. Eleven shots, 8 hits.

III. Fifteen shots, besides one in chamber not fired.

IV. Worked well throughout excepting the usual difficulty in extraction, which did not obtain when the Martin or Remington cartridges were used. During the third 50 rounds one head burst, doing no harm.

OCTOBER 30, 1872.

V. No. 1. Worked freely; 20 shots fired without trouble; one head burst.
No. 2. Worked freely; 20 shots fired without trouble.

NOVEMBER 11, 1872.

VI. The breech opened very hard, although the hammer was snapped upon the firing-pin several times beforehand. Twenty shots were fired, the extractor working hard throughout.
VII. The three charges were fired without failure, the breech opening harder after the last shot than at any time since the rusting.

OCTOBER 30, 1872.

Display.—Mr. Bush, agent, using Remington brass cartridges, in 1 minute fired 18 shots at will; one failed; had no anvil. Using service-ammunition, he fired 19 shots at will.

REMINGTON, No. 22.

OCTOBER 29, 1872.

The safety-test was complied with. Everything worked well.
I. No. 1. Strong escape of gas above.
No. 2. Strong escape of gas above.
No. 3. No escape of gas.
II. Eleven shots, 10 hits.
III. Fifteen shots.
IV. First 50 rounds worked well. At their conclusion it was found that by a slight touch on the trigger, as the breech-block was closed, the hammer, though at half-cock, would also fall; this was claimed by the agent to be due to a defective shape of the half-cock notch, which, on his application, he was allowed to modify. In doing so, however, the mainspring broke from a fire-crack, and the arm was set aside.

NOVEMBER 12, 1872.

The mainspring broken October 29 having beeen replaced, the test was continued up to the two hundred and fiftieth fire without failure.

NOVEMBER 13, 1872.

The test was completed. Toward the last the hammer worked hard, and a few shells extracted hard. During the last 50 rounds one cartridge missed fire twice, but exploded under the prick-punch.

NOVEMBER 15, 1872.

V. Opened and worked freely throughout.

NOVEMBER 18, 1872.

VI. Opened and worked freely throughout.
VII. Worked freely throughout.

SPANISH REMINGTON, No. 41.

This arm was not chambered for the service-cartridge, but used the Russian-Berdan ammunition, caliber .42.

OCTOBER 30, 1872.

Display.—The safety-test was complied with by Mr. Bush firing in one minute, at will, 21 shots, besides one in chamber not fired.

I. No. 1. Strong escape above and below. Paper torn in two.
No. 2. Paper torn in pieces by gas.
No. 3. No escape of gas.
II. Fifteen shots, 9 hits.

OCTOBER 31, 1872.

III. Twenty shots, besides one in chamber not fired.
IV. The gun worked well throughout.
V. No. 1. The first cartridge was inserted with difficulty; 20 shots were fired without trouble.
No. 2. Worked well after exposure and while firing 20 shots.

NOVEMBER 11, 1872.

VI. The breech opened very hard; 20 shots were fired; everything worked well.
VII. Nos. 2 and 3 missed fire, but exploded on the second trial. The hammer fell weakly as if impeded by rust.

REMINGTON, No. 43.

NOVEMBER 12, 1872.

The safety-test was fired by the agent.

I. No. 1. Escape of gas above and on the side.
No. 2. Strong escape of gas above and on the side.
No. 3. No escape of gas.
II. Twenty shots, 10 hits.
III. Twenty-one shots.

NOVEMBER 13, 1872.

IV. Three hundred rounds were fired. The extractor worked well. The test was completed. During the tenth 50 rounds one cartridge missed, but went on second trial.

NOVEMBER 15, 1872.

V. Opened and worked well throughout.

NOVEMBER 18, 1872.

VI. Opened and worked freely throughout.
VII. Worked hard throughout, especially after third fire.
Display.—By Mr. Bush, 21 shots.

SMOOT.

OCTOBER 30, 1872.

The safety-test was complied with; everything worked well.
I. No. 1. Escape of gas above.
No. 2. Escape of gas above.
No. 3. No escape of gas.
II. Fourteen shots, 13 hits.
III. Thirteen shots, 3 shells stuck hard.
IV. Nine cartridges burst in the head during this test, without, however, doing any harm. After the first 100 rounds the hammer was observed to rebound after striking. The system was examined and the mainspring stop-pin found to have worked down, and thereby to have impaired its action. This was remedied, and the firing went on. Toward the last the block occasionally stuck very hard in opening. This was found due to the burning of the cartridge-head into the firing-pin hole, which was so large as not to afford the necessary support.

OCTOBER 31, 1872.

V. No. 1. Worked freely; 20 shots fired without trouble.
No. 2. Ground slightly in opening; 20 shots fired without trouble.

NOVEMBER 11, 1872.

VI. The gun worked extremely hard, the foot having to be used to open the breech. Fired 20 shots, which were extracted with difficulty. A Martin cartridge was then fired and extracted a little more easily.
VII. The third discharge blew open the head of the cartridge near the top, where it was unsupported by the breech-block. The breech had to be opened with the foot.

PEABODY.

OCTOBER 28, 1872.

The safety test was complied with; everything worked well.
I. No. 1. A slight escape above.
No. 2. Strong escape in every direction, tearing the paper.
No. 3. Slight escape from below, on the right side.
II. Thirteen shots, 11 hits.
III. Seventeen shots; dropped one cartridge in loading.

IV. Fired from a fixed rest, which interfered somewhat with the motion of the hand in opening the breech. During the eighth 50 rounds one head burst, the gas scorching the firer's face, although he was standing opposite the butt of the piece, an effect claimed by the agent to be due to his position, and not to be expected in the usual course of firing. In the ninth 50 rounds two cartridges extracted hard, the piece having to be removed from the rest to get one of the shells out. This was claimed by Mr. Peabody as due to the cup-anvil having been driven forward and wedged in the taper of the shell. Otherwise the arm worked well. (See record of incomplete tests, page 88.)

OCTOBER 29, 1872.

V. Worked freely throughout the test.

OCTOBER 31, 1872.

VI. Opened hard at first, but afterward worked freely; fired 20 rounds without trouble.
VII. Everything worked well throughout the test.

BROUGHTON, No. 18.

NOVEMBER 12, 1872.

The safety-test was complied with.
I. No. 1. Strong escape of gas above.
No. 2. Strong escape of gas above.
No. 3. No escape of gas.
II. Fifteen shots, besides one in chamber not fired, and one dropped in loading; 10 hits.

NOVEMBER 14, 1872.

III. Twenty-one shots, besides one in chamber not fired.
IV. Three hundred rounds were fired. The test completed.

NOVEMBER 15, 1872.

V. Opened and worked freely throughout.

NOVEMBER 18, 1872.

VI. Opened and worked freely throughout.
VII. Opened very hard; after the third fire the cartridge-head was discovered blown off.

BROUGHTON, No. 45.

NOVEMBER 12, 1872.

The safety-test was complied with; one cartridge missed fire, exploding afterward under a prick-punch.
I. No. 1. Slight escape of gas from the side.
No. 2. Same.
No. 3. Same.

NOVEMBER 14, 1872.

II. Fourteen shots, besides one dropped in loading; one missed fire, but went on the second trial; 11 hits.

III. Ten shots, requiring a hard blow against the block every time to release the bolt.

NOVEMBER 13, 1872.

IV. Three hundred rounds were fired; toward the last the bolt stuck badly in opening, the difficulty becoming greater as the test went on.

NOVEMBER 14 AND 15, 1872.

The test was completed. The arm opened very hard throughout, from the causes stated yesterday. When service-cartridges were used, the breech-block generally required a sharp blow with a stick to start it. With brass shells it worked freely.

V. Worked easily, except when firing service-cartridges as before. The trouble found in this gun arose from the head of the cartridge swelling back against the breech-block, and thus keeping it tightly pressed against the firing-bolt, by which it is locked in place.

NOVEMBER 18, 1872.

VI. Opened very hard; the bolt having to be kicked open, and the block struck a sharp blow with a stick to start it.

VII. Opened very hard; after the third fire the cartridge-head was found split about the rim, and blown into the extractor-recess.

FEBRUARY 19, 1873.

With a clean gun. Returned after alleged correction of defects found in opening the breech, (*vide* November 18, *et ante*,) by beveling off the front of the hammer, so that it would not punch after firing.

VII. Nos. 1 and 2. Opened rather hard.

No. 3. Head burst. The block had to be struck with a stick to liberate the hammer. Mr. Clark, the agent, claimed that this was due to the block not having been completely closed in the first instance.

FEBRUARY 21, 1873.

VII. A clean gun. Repeated, owing to the request of before-mentioned Mr. Clark, the agent.

Nos. 1 and 2. Everything worked well except that the first of the 90-grain charges missed three times.

No. 2. Stuck hard in opening, though not as badly as before.

UPDEGRAFF.

NOVEMBER 13, 1872.

The safety-test was complied with.

I. No. 1. Escape of gas above and on the sides. The paper torn.
No. 2. Strong escape of gas above. The paper was torn.
No. 3. Very slight escape of gas.

NOVEMBER 14, 1872.

II. Eighteen shots, 7 hits.

III. Nineteen shots, besides one in chamber not fired.

NOVEMBER 13, 1872.

IV. Two hundred rounds were fired. During the second 50 one cartridge missed, but went on second trial. During the fourth 50 two missed, but went on second trial. During the first 50 occasional difficulty was found in the automatic opening of the breech-block. This was remedied by allowing the point of the firing-pin to be ground off, so that it should project 0″.08 the usual distance, instead of 0″.13.

NOVEMBER 14, 1872.

Completed the test. During the sixth 50 rounds one cartridge missed fire, but went on the second trial. During the ninth 50 rounds one cartridge missed three times, but exploded under the prick-punch. Toward the last of the trial the piece opened very hard, a fact which was not observed when the Berdan brass shells were afterwards tried.

NOVEMBER 15, 1872.

V. Opened and worked freely throughout. After second dusting one cartridge missed fire, but exploded on the second trial.

NOVEMBER 18, 1872.

VI. Opened very hard, and failed to perform its automatic functions until loosened by repeated working to and fro, moving very hard and imperfectly even then. Great difficulty was found in inserting the first cartridge, which required five blows to explode it. The third cartridge failed once, but went on the second trial. The extraction was very imperfect, force having to be applied to the breech-block with a stick.

VII. No. 1. Missed once; fired on second trial.
No. 2. Opened hard; had to use a stick.
No. 3. Missed once; fired on second trial.

Opened so hard as to require a man's full strength, applied by means of a stick laid across the comb of the hammer. Mr. Updegraff was allowed to strip the gun, in order to ascertain the cause of its failure. The works generally were found well rusted. After drenching them with oil, and wiping off the breech-block thoroughly, the system worked better than before.

NOVEMBER 14, 1872.

Display.—By Mr. Updegraff; 21 shots.

WHITNEY, No. 11.

NOVEMBER 19, 1872.

The safety-test was fired by the agent.

I. No. 1. Escape of gas above. Paper torn.
No. 2. Escape of gas above and on sides. Paper torn to pieces.
No. 3. Slight escape of gas.

II. Sixteen shots, besides one in chamber not fired; 13 hits.

III. Twenty-two shots.

IV. Fired 400 rounds. During the second 50 rounds one case cracked longitudinally without doing any harm. After the fourth 50 rounds the hammer pin-screw was discovered loose, and the pin working out of place in consequence. The screw was turned home.

NOVEMBER 20, 1872.

Completed the 500 rounds.

V. No. 1. Grated and worked imperfectly in opening, the breech-block not being thrown entirely back by its spring. On pulling the trigger when the hammer was down, it would catch on the inside of the guard-bow, and remain with the sear out of the notch until replaced.
No. 2. Trigger caught repeatedly. The breech-block spring and ejector did not work effectively.

VI. Opened and worked easily throughout.

NOVEMBER 22, 1872.

VII. Worked easily throughout; at the third fire the cartridge-head blew off, doing the piece no harm.

NOVEMBER 20, 1872.

Display.—Using Berdan brass cartridges, one missed fire, but went on second trial; they extracted well, but were not ejected.

WHITNEY, No. 13.

NOVEMBER 19, 1872.

The safety-test was fired by the agent.

I. No. 1. Escape of gas above. The paper was torn.
No. 2. Escape of gas above and to the sides. Paper was torn.
No. 3. A slight escape of gas above. The gas fouled the mechanism so that it worked very hard until it was cleaned.

II. Eighteen shots, besides one in the chamber not fired. It was here discovered that the gun was unable to withdraw the loaded cartridge, which had therefore to be fired. Fifteen hits.

III. Twenty-two shots, besides one in chamber not fired.

IV. Fired 400 rounds. The extractor worked badly, often failing to withdraw the shells more than ¼ inch. Although, at the agent's request, the extractor-screw was several times loosened, its ac-

tion was not improved. After the first 50 rounds the firing-pin was found to project slightly, and was filed off to the proper length. It happened several times that the hammer was not caught, as designed, on the safety-notch. During the fifth 50 rounds one cartridge missed fire three times, but exploded under the prick-punch.

NOVEMBER 20, 1872.

Completed the 500 rounds. The extractor worked badly, the shells having to be pulled out with an iron tool. During the last 50 rounds the hammer followed the breech-block as before.

V. It opened freely and worked as before.

NOVEMBER 22, 1872.

VI. Opened easily and worked throughout as before.

VII. Worked easily throughout. At the third fire the cartridge-head blew off, doing the piece no harm.

NOVEMBER 20, 1872.

Display.—IV.—With brass shells it worked more freely.

V. With brass shells it worked more freely, as before; they were extracted easily, but not ejected.

SPRINGFIELD.

NOVEMBER 21, 1872.

The safety-test was complied with.

I. No. 1. A strong escape of gas to the sides.
No. 2. Escape of gas to the sides.
No. 3. Slight escape of gas to the sides.

II. Seventeen shots, 10 hits.

III. Twenty-two shots, besides one in the chamber not fired.

IV. The test was completed.

V. The gun worked well throughout.

DECEMBER 2, 1872.

VI. After the first cartridge the cam stuck very slightly in opening. The gun worked well throughout.

VII. After the third fire the cam stuck very slightly in opening. Otherwise everything worked well.

WARD-BURTON.

DECEMBER 3, 1872.

The safety-test was complied with.

I. No. 1. Escape above along line of the recoil-block.
No. 2. Same.
No. 3. Slight escape as before.

II. Twenty shots, 13 hits.

III. Twenty-five shots, besides 2 dropped in loading.

IV. The test was completed. During the second 50 rounds one cartridge missed fire and failed to explode under the prick-punch. During the fifth 50 rounds the front guard-screw was broken, showing signs of excessively coarse crystalline structure. It was replaced and the trial gone on with.

V. Worked well throughout.

DECEMBER 6, 1872.

VI. The gun was not very rusty, owing to the solution having been retained in the breech-bolt, and thus keeping the rust from drying hard. The gun worked well throughout the test.

VII. The gun worked freely throughout; at the third fire the shell was blown into the extractor-hole.

DECEMBER 3, 1872.

Display.—Another Ward-Burton musket was fired by an expert, Mr. Strube, with service-ammunition from cartridge-box.

II. Nineteen shots, 18 hits.

III. With Berdan brass ammunition from cartridge-box; 29 shots, besides 1 dropped in loading.

A Ward-Burton carbine furnished with gas-ports, intended to direct the escape from defective cartridges upward, diagonally, to the right and left, was fired.

I. Nos. 1. and 2 showing escape through ports.
No. 3. Slight escape as before.

The fouling also worked back somewhat into the receiver. (See record of incomplete tests, page 89.)

ELLIOT.

DECEMBER 6, 1872.

The safety-test was complied with.

I. Nos. 1 and 2. Strong escape of gas above, and a slight one below. The piece opened hard, but afterwards worked freely.
No. 3. No escape.

II. Eighteen shots, besides one in the chamber not fired; 9 hits.

III. Twenty-six shots.

IV. The gun worked well throughout.

V. The piece worked well throughout.

DECEMBER 9, 1872.

VI. Opened and worked very hard, the breech-block having to be rapped, and the hammer repeatedly worked to and fro to move the other parts.

VII. Worked as above, except that no additional trouble was found due to the excessive charges. At the first fire the cartridge-head cracked. In oiling and working the arm afterwards the trigger-spring was accidentally broken.

FREEMAN.

DECEMBER 5, 1872.

The safety-test was complied with.
I. No. 1. Escape to the left. Paper was torn.
Nos. 2 and 3. Slight escape to the left.
II. Fourteen shots, 6 hits.
III. Sixteen shots.

DECEMBER 6, 1872.

IV. Before firing, the cam-screw was found loose, and screwed home. Two hundred rounds were fired; one head burst during each of the first three 50 rounds, doing the piece no harm. The arm was then withdrawn to allow the breech-block to be fitted more closely against the head of the cartridge.

DECEMBER 9, 1872.

Replaced after changes made as suggested in journal of December 6. The safety-test was omitted.
I. Nos. 1 and 2. Strong escape above and to the side. The paper was torn.
No. 3. A slight escape as before.
II. Fourteen, besides one in chamber not fired; 10 hits.
III. Eighteen, besides one in chamber not fired, and two dropped.
IV. The test was completed, the arm working well throughout. During each of the third and fifth 50 rounds one cartridge missed fire, but went at the second trial.
V. The arm worked well throughout.

DECEMBER 13, 1872.

V. Worked freely throughout.
VII. After the third fire, had to be opened with the foot, pulling off the head of the cartridge in doing so. By snapping the hammer after the piece was cleaned, the firing-pin was accidentally broken off at its rear shoulder, showing signs through the oil-stain of the progressive character of the fracture.

ALLIN.

DECEMBER 17, 1872.

The safety-test was complied with.
I. Nos. 1 and 2. Strong escape to the sides, tearing the paper.
No. 3. Slight escape to the sides.
II. Sixteen shots, besides one in chamber not fired; 12 hits.
III. Twenty-three shots.
IV. The test was completed; everything worked well.
V. Everything worked well.

JANUARY 13, 1873.

VI. Well rusted throughout lock, and in the cam-latch recess; worked easily.
VII. Worked well. The head of the third cartridge burst, doing no harm.

BERDAN-RUSSIAN.

DECEMBER 17, 1872.

The safety-test was complied with.

I. Nos. 1 and 2. Very strong escape to sides, tearing the paper.
No. 3. Slight escape to the sides.

II. Fourteen shots, 13 hits; the breech-bolt closing hard.

III. Eighteen shots, besides one in chamber not fired.

IV. The test was completed; 4 shells not being ejected had to be picked out of the receiver with the fingers. During the ninth 50 rounds, one cartridge missed fire, but exploded on second trial. The block closed hard as before, requiring two motions.

V. The test was completed; everything worked well.

DECEMBER 20, 1872.

VI. The arm was opened with great difficulty, having to be struck very hard in order to liberate the bolt. Twenty shots were fired, the arm working more freely as the test went on.

VII. The arm worked as above throughout.

LEE, No. 54.

DECEMBER 19, 1872.

The safety-test was complied with.

I. No. 1. Strong escape above, tearing the paper.
No. 2. Same, with slight escape below.
No. 3. No escape.
After firing the service-cartridge the piece was opened with so much difficulty that it was impossible to continue the test. Thereupon Mr. Lee obtained permission to complete this and the third test with Martin cartridges, with these he obtained:

II. Sixteen shots, 9 hits. Two miss-fires, one of which went on the third trial. The other failed three times, but was exploded with the prick-punch. The gun worked hard throughout.

III. Twenty-two shots, and one dropped in loading; 1 miss-fire went on second trial.

IV. Using service-cartridges, the test was completed. During the fifth 50 rounds, one cartridge failed three times, but was fired with prick-punch.

V. After the first exposure the mainspring was found to be broken in two places, and the test was therefore suspended.

JANUARY 13, 1873.

The mainspring broken December 19 having been replaced, the test was completed; everything working well.

JANUARY 16, 1873.

VI. Breech-block opened freely, though not held effectively by the breech-block catch. At first the breech-block came up with great difficulty, and required a hard blow to open it. The gun

worked more easily as the trial went on, though it was scarcely ever opened by the natural use of the thumb.

VII. Nos. 1 and 2. Everything worked well.

No. 3. One failed three times, but exploded under prick-punch. Two fired with difficulty, from the hammer being rust-bound. The cartridge-head burst, doing the piece no harm.

LEE, No. 61.

DECEMBER 19, 1872.

The safety-test was complied with.

I. No. 1 Strong escape above.

No. 2. Slight escape above.

No. 3. Very slight escape above.

II. Fourteen shots, 11 hits.

III. Nineteen shots, besides two dropped and one in chamber not fired.

IV. The test was completed. During the first 50 rounds one cartridge missed fire, but went on second trial.

V. The gun pulled off very hard after the first exposure.

JANUARY 10, 1873.

VI. Opened hard, and worked stiffly throughout.

VII. Opened hard, and worked stiffly throughout.

ROBERTS.

JANUARY 7, 1873.

The safety-test was complied with.

I. Nos. 1 and 2. Very strong escape above, blowing a hole in the paper.

No. 3. Very slight escape above. The piece was worked with difficulty, owing to the fouling of the mechanism by the gas.

II. Seven shots, besides one dropped in loading, and one in chamber not fired. Six hits.

III. Eleven shots, besides two dropped in loading, and one in chamber not fired. This excessive dropping of cartridges was due to the accidental locking of the breech-block after opening from the action of the breech-block spring, which, being unobserved by the firer, caused him to press with such force on the breech-block to open it that the cartridges would slide off and fall to the ground.

IV. At the fifty-first fire the mainspring broke, showing a fine clean fracture, clear from cracks. The gun was then set aside for further action by the Board.

JANUARY 13, 1873.

The mainspring having been replaced by order of the Board, the test was resumed and completed.

V. The test was completed. One cartridge missed fire three times, but exploded under the prick-punch.

JANUARY 16, 1873.

VI. Opened very hard; could not be locked by cocking the hammer until 17 shots had been fired.
VII. Worked well throughout.

SPRINGFIELD-STILLMAN.

JANUARY 13, 1873.

The safety-test was complied with.
I. No. 1. Slight escape above.
No. 2. Escape along line of receiver.
No. 3. No escape.
II. Nineteen shots, 11 hits.
III. Twenty-three shots.
IV. The test was completed, everything working well.
V. The test was completed, everything working well.

JANUARY 16, 1873.

VI. Opened and worked easily throughout.
VII. Worked easily throughout. No. 3 cartridge-head burst, doing the piece no harm.

REMINGTON-RYDER, No. 67.

JANUARY 13, 1873.

The safety-test was complied with.
I. Nos. 1 and 2. Very strong escape above and below, tearing the paper.
No. 3. Very slight escape.
II. Fifteen shots, 13 hits. The breech opened with the thumb. Ejection interfered with by the shells striking against the thumb.
III. Twenty-one shots; ejection as before; opened at will.
IV. The test was completed. One cartridge missed fire, but went on second trial.
V. Everything worked well.

JANUARY 16, 1873.

VI. Had to be opened by pounding on the firing-pin to liberate the retractor, and then on the thumb-piece to move the block. Twenty shots were fired without failure, the arm working stiffly throughout. It was discovered afterward that the ejector-spring had broken before the test was begun. Its absence, however, was not perceptible from the working of the piece.
VII. No. 1. Everything worked well.
No. 2. The piece opened hard.
No. 3. The cartridge-head burst, doing the piece no harm. The breech was opened with the foot.

WARD-BURTON MAGAZINE-CARBINE.

February 4, 1873.

Ward-Burton magazine-carbine, carrying 8 shots in the magazine and 1 in the chamber, firing a special recessed copper-cap cartridge, holding 55 grains powder and 360 grains lead. The safety test was complied with. The following modifications of the required tests were agreed to and carried out, with the specification that throughout, when practicable, the magazine should be held full in reserve:

I. Firing 10 rounds as a single-loader, holding the magazine in reserve. Everything worked well.

II. Number of shots in one minute, with aim at the usual target and distance, using the arm as a single-loader and holding the magazine in reserve, 23 shots, 13 hits.

III. Same at will, 24 shots, besides one dropped in loading.

IV. Two cartridges caught in the receiver in loading, and interfered with manipulation of the arm. Time required to fire and load 3 magazinefuls, (24 shots,) starting with a full magazine, 1 minute 35 seconds.

V. Time required to fire 9 shots, starting with a full magazine and chamber, 10½ seconds.

VI. Time required to fire 9 shots as a single-loader, starting with a full chamber, 17½ seconds. Repeated in 18 seconds.

VII. Defective cartridges:
Nos. 1 and 2. Strong escape above, along line of receiver.
No. 3. No escape.

VIII. Endurance. Everything worked well firing the 500 shots, the last eight of which had been in the magazine throughout the test. During the eighth 50 rounds one cartridge missed fire from having no cup or fulminate.

IX. Dust. 1. The gun was started, working with some difficulty, but afterward fired 20 shots with ease.
2. Everything worked well.

FREEMAN, No. 76.

February 5, 1873.

The safety-test was complied with.

I. No. 1. Strong escape through left-hand gas-port, blowing a hole in the paper and setting fire to it.
No. 2. Strong escape through both gas-ports, blowing a hole in the paper.
No. 3. No escape.

II. Sixteen shots, besides one dropped in loading; 6 hits.

III. Seventeen shots, besides four dropped in loading, from imperfect manipulation, the cartridge occasionally striking the side of the chamber instead of entering it, and sometimes being thrown out by the ejector-spring before the block could be closed. Repeated: 21 shots, besides one dropped in loading.

IV. Three hundred rounds were fired. The counter-bore of the chamber was so shallow that difficulty in closing the piece was found throughout the test. Three cartridges, in consequence, could not be introduced into the chamber.

FEBRUARY 6, 1873.

The test was completed, the arm working as before. During the seventh 50 rounds one cartridge missed fire three times. It was found to contain an insufficient quantity of fulminate.

V. Worked freely after each exposure.

FEBRUARY 18, 1873.

VI. Opened and worked freely throughout.

VII. Nos. 1 and 2. Worked well.

No. 3. Opened hard; the cartridge-head burst into the extractor-recess.

ELLIOT, No. 80.

FEBRUARY 5, 1873.

The safety-test was complied with.

I. No. 1. Strong escape above.

No. 2. Very strong escape above.

No. 3. No escape.

II. Twenty-one shots, 11 hits.

III. Twenty-five shots.

IV. Three hundred rounds were fired; with the exception of the same trouble found in the Freeman gun, which obtained in this arm in a somewhat less degree, the arm worked well.

FEBRUARY 6, 1873.

The test was completed, the arm working as before.

V. Worked freely after each exposure.

FEBRUARY 18, 1873.

VI. Opened and worked freely throughout.

VII. Nos. 1 and 2. Worked well.

No. 3. Cartridge-head burst into the extractor-recess. Shell was driven out with the ramrod.

BROUGHTON, No. 79.

FEBRUARY 19, 1873.

The safety-test was complied with.

I. Nos. 1 and 2. Violent escape of gas above and to the sides, tearing the paper to pieces.

No. 3. Slight escape of gas.

II. Sixteen shots, besides one dropped in loading. Once the trigger was pulled before the block was fully closed, causing a miss-fire; 9 hits.

III. Twenty shots, besides one in the chamber not fired.

IV. Four hundred rounds were fired. The uncertainty affecting the complete closing of the breech, above noticed, was observed throughout.

FEBRUARY 20, 1873.

The test was completed.

Although due care was taken in closing the block, during the last 50 rounds, two cartridges failed at the first blow of the hammer, but went under the second trial. The faintness of the impression renders it probable that this was due to the striking of the hammer against the block.

V. The test was completed; everything worked well.

WINCHESTER MAGAZINE-MUSKET, No. 78.

FEBRUARY 19, 1873.

Magazine-musket, carrying 10 shots in the magazine, besides 1 in the carrier, if necessary, the charge being 70 grains powder and 360 grains lead.

The safety-test was complied with.

I. Nos. 1 and 2. Very violent escape above, tearing the paper.
No. 3. Escape of gas above.

II. As a single-loader, with aim, holding magazine in reserve. Eleven shots, besides one in chamber not fired. One cartridge failed from having no powder; 7 hits.

III. Rapidity at will, first emptying the magazine and then continuing as a single loader. Twenty-two shots in one minute.

IV. Rapidity at will, as a single-loader, holding the magazine in reserve. Eighteen shots, besides one in chamber not fired. One cartridge missed, but went under the prick-punch.
Repeated, as a display, by Mr. Bennett, agent; 25 shots. One missed, but could not be found for trial with the prick-punch.

V. The time required to fire three magazinefuls, (30 shots,) starting with a full magazine, 28 fires in 1 minute 9 seconds. In the haste of loading, one cartridge was omitted from each of the last two magazinefuls.

VI. The time required to fire 11 shots from the magazine, 1 cartridge being in the carrier, 10 shots in 18¼ seconds.
One cartridge failed to come down, owing to accidental derangement of the cut-off in firing.
Repeated. Eleven shots in 7½ seconds.

VII. Eleven shots as a single-loader, holding full magazine in reserve, fired in 31½ seconds.

VIII. Endurance. Two hundred rounds were fired; everything working well.

FEBRUARY 20, 1873.

The test was completed, keeping the magazine in reserve. It was observed that the stock was split for about 12 inches in front of the guard-strap. The rear end of the lever was so marred as to be closed with difficulty. It was found that, in closing the breech before the lever came fully into place, the safety-latch in rear of the trigger might be accidentally touched, so that the trigger could be pulled and the piece discharged before it was securely locked.

IX. Dust. The arm worked well throughout.

At the conclusion of this test the cartridges which had been retained in the magazine from the beginning were fired. Although the balls were much flattened and upset by the repeated concussion of firing, everything worked well.

I.—REGULAR SERIES OF TESTS—(*b*) INCOMPLETE.

EVANS.

October 10, 1872.

Mr. Evans fired 26 shots in 1½ minutes, using his piece as a single-loader, and firing at will; no miss-fires. He loaded his magazine with 38 cartridges in 1 minute, and then fired the piece as a single-loader, holding his magazine in reserve, and loading through the butt to supply the place of cartridges discharged, 18 times in 1 minute; no miss-fires. He fired the 38 shots from the magazine in 19 seconds; no miss-fires.

A handful of dry, fine sand was sifted over the exposed parts of the breech, which, together with a broken firing-pin, effectually clogged the working of the piece. Mr. Evans claimed the breaking of the firing-pin during the previous trial as due to defective tempering of the metal.

ROBERTS.

October 23, 1872.

General Roberts fired 10 rounds as a test of safety, using service-cartridges.

II. R. T. Hare firing 12 shots, 11 hits. Cartridge-shells extracted with extreme difficulty.

III. Fifteen shots, 1 miss-fire, which afterwards fired in Springfield musket, model 1868.

IV. First 50 rounds, 1 miss-fire, which exploded on second fire.
Second 50 rounds, 1 missed twice, but exploded when struck with a prick-punch.
Third 50 rounds, 1 miss-fire, which exploded on second trial.
Fourth 50 rounds, at the sixth fire the stock split off in a piece 6 inches long in the neighborhood of the left recoil shoulder. The stock was also splintered in rear of the tang. The firing with this gun was then suspended.

Display.—Under test III General Roberts fired 17 shots, using Martin improved cartridges; 8 miss-fires, which afterward exploded in a Springfield musket, model 1868.

In his hands the extraction was easily performed.

REMINGTON, No. 23.

October 28, 1872.

The safety-test was complied with; everything worked well.

I. No. 1. Slight escape above and on each side.

No. 2. Slight escape above.
No. 3. No escape.

II. Fifteen shots, 14 hits.

III. Eighteen shots.

IV. First 50 rounds, worked very hard after firing; proved to be due to the cartridge by firing a Martin shell. The firing was continued through the four hundredth round without further trouble than that noticed above, and the usual incomplete ejection of the shell. After the test was completed, 15 Remington brass shells were fired and extracted easily.

OCTOBER 30, 1872.

The test was continued without trouble until the three hundred and ninetieth fire, when the hammer had to be worked back and forth several times in order to bring the recoil-brace out of the way of the breech-block. This happened twice afterwards before the completion of the 400 rounds. The system was then examined and the dog-spring found broken, rendering the gun unserviceable.

Display.—Before this test Mr. Bush, using Remington brass ammunition, fired in 1 minute 25 shots at will.

THOMAS.

NOVEMBER 12, 1872.

The safety-test was fired by the agent.

I. Nos 1 and 2. Escape of gas above.
No. 3. No escape.

NOVEMBER 14, 1872.

On examining the arm before test I and II, the working of its mechanism was discovered to be so imperfect that its trial was ordered to be discontinued. On handing over the piece to the agent it was claimed by him that the fly had been turned upside down, although it was asserted by the employé in charge of the piece that it had not been taken apart since the endurance-test of yesterday, during which it worked freely. The agent having been allowed to correct the defect, the gun was received anew and tested, being fired by Mr. Lyon, Mr. Hare's hand being disabled from injuries previously received.

II. Twelve shots, besides one in the chamber not fired; 4 hits.

III. Sixteen shots, besides one in the chamber not fired.

NOVEMBER 12, 1872.

IV. Fired 400 rounds. After the seventh 50 rounds the movement of the breech-block was much impeded; the cause of this could not be definitely ascertained, owing to the block having been inconsiderately taken out after gun was cooled and before the assembling of the Board.

NOVEMBER 13, 1872.

The gun worked more easily than when left yesterday. The test was completed.

NOVEMBER 14, 1872

V. Opened and worked well throughout.

NOVEMBER 18, 1872.

VI. Opened freely; the fly failed to move out of the way of the hammer in falling. The arm was ordered set aside for further examination, by which its action was found impeded with rust, and the impossibility of setting the fly upside down, as claimed by the agent November 14, fully demonstrated.

MORGENSTERN.

Using Russian ammunition brass shell.

NOVEMBER 13, 1872.

The safety-test was complied with.

I. No. 1. The paper was torn to pieces.
No. 2. Very slight escape above.
No. 3. No escape.

IV. After 8 shots the breech-block would not close sufficiently to allow the bolt to slide through it freely, and the gun was set aside.

GREENE.

NOVEMBER 14, 1872.

The safety-test was complied with, using the arm both as a magazine-gun and a single-loader.

I. No. 1. Escape on right side; paper torn.
No. 2. Escape on right side.
No. 3. No escape.

NOVEMBER 15, 1872.

II. Fifteen shots; dropped 2 cartridges through the well in loading; 9 hits.

III. Eighteen shots, besides one in chamber not fired.

NOVEMBER 14, 1872.

IV. Fired 150 rounds.

NOVEMBER 15, 1872.

Completed the test; several shells in extracting turned in the well of the receiver and were gotten out with great difficulty.

V. The gun opened, worked, and pulled off hard throughout.

NOVEMBER 18, 1872.

VI. Opened very hard, having to be kicked open and struck with a stick. The surface of the bolt was found thoroughly rusted. On attempting to fire it it was found that when cocked the firing-bolt could not be released. The arm was then set aside.

ROBERTSON.

Using Spencer cartridges, rim-fire, caliber .52.

NOVEMBER 19, 1872.

The safety-test was fired by Mr. Hare.

II. Thirteen shots, 11 hits. One cartridge missed fire, but exploded on the second trial.

At this point the Board granted Mr. Robertson permission to withdraw his gun for the purpose of altering it so as to fire the United States service-cartridge.

DECEMBER 5, 1872.

The safety-test was complied with.

I. No. 1. Strong escape below and above; the paper was torn.
No. 2. Slight escape below and a strong one above; the paper was torn.
No. 3. No escape.

II. Fourteen shots, 11 hits. In working the lever the firer's hand was badly cut by the back of the trigger.

III. Sixteen shots, and one in chamber not fired. The same trouble obtained with the trigger.

DECEMBER 6, 1872.

IV. Fifteen rounds were fired, when it was discovered that the piece could be fired before the breech was locked. The arm was then withdrawn by Mr. Robertson in order to make the necessary changes.

JANUARY 15, 1873.

The defect found December 6 having been corrected, the trial was resumed at the fourth test. Eighteen rounds were fired, when one head burst into the extractor-recess, the gas issuing with great force into the face of the firer. Mr. Robertson then withdrew the arm for change.

SPENCER.

NOVEMBER 19, 1872.

The safety-test was fired by Mr. Hare.

I. No. 1. Escape of gas above and to the sides; the paper was torn.
No. 2. Escape of gas above, below, and on the s des.
No. 3. No escape.

II. Thirteen shots, besides one in the chamber not fired; 13 hits.

III. Nineteen shots.

IV. Four hundred rounds were fired, the gun working stiffly throughout.

NOVEMBER 20, 1872.

The test was completed.

V. The test was completed, the gun working freely after exposure.

NOVEMBER 22, 1872.

VI. The arm opened and worked so hard that after firing 7 shots the trial was discontinued, and it was ordered set aside for further action by the Board.

JOSLYN-TOMES.

NOVEMBER 20, 1872.

A few shots were fired, but it worked so hard that further trial was postponed until the arrival of the agent.

NOVEMBER 21, 1872.

The safety-test was fired by Mr. Hare with Martin cartridges, which the Board authorized for the test of this gun in consequence of the sticking of the Frankford shells.

I. Nos. 1 and 2. A strong escape of gas above.
No. 3. No escape.

II. Fourteen shots, 12 hits; 2 miss-fires; went on second trial.

III. Seventeen shots, 4 miss-fires; 3 went on second trial, and 1 on third trial. Its working was so poor and the failures so frequent that it was decided to postpone further trial with the arm.

DECEMBER 3, 1872.

Using Martin cartridges. (See Journal Nov. 21.)

II. Fifteen shots, 6 hits; 3 missed fire, of which 2 went on second trial and 1 on third trial.

III. Twenty shots; 1 missed fire but went on second trial. The extractor failed to withdraw two shells on first trial. The arm opened and extracted hard throughout.

IV. The use of the service-cartridge was here directed by the Board for the ensuing trial. During the first 50 rounds one cartridge missed fire, and failed when tried under the prick-punch. When opened the amount of fulminate was discovered insufficient. During the third 50 rounds one cartridge missed fire, but went on the second trial. During the sixth 50 rounds 5 shells could only be extracted by repeated attempts with the bolt, or by using the ramrod, 1 cartridge-rim being torn through by the extractor. It was therefore—

Resolved, That, in the opinion of the Board, the experiments have shown that the Joslyn-Tomes system would require such radical changes to render it suitable for military service as to make its further consideration by them unnecessary.

The arm was then set aside, to await further action by the full Board.

JANUARY 7, 1873.

This arm, returned by Mr. Joslyn after repairing the extractor which gave out November 21, was fired, beginning at the fourth test, as follows:

IV. During the first and ninth 50 rounds 2 cartridges missed fire, but went on the second trial. During the tenth 50 rounds 1 car-

tridge-head burst, doing the piece no harm. As a rule, throughout the trial, unless the breech-bolt was brought back with great force, the shell would not be ejected from the receiver. The bolt, after firing, sometimes stuck so hard as to require considerable force to open it. Otherwise the piece worked well.

V. At the eighteenth round the firing-pin was found broken near the point, and the piece laid aside and permission given to replace it.

JANUARY 8, 1873.

After replacing firing-pin, the test, after the first exposure, was completed; everything worked well. 2. Three cartridges missed fire, but went at the second trial, Mr. Joslyn claiming that this was due to neglecting to close the breech with sufficient force; fired 10 shots without failure.

JANUARY 10, 1873.

Worked very hard, having to be forced open with the foot.

VI. Sixteen shots were fired, 9 missed fire; 6 of which went on second trial; 1 of which went on third trial; and two of which went under prick-punch. The gun had to be opened with the foot four times. It was closed twice with almost as much difficulty. After the sixteenth shot, finding it impossible to close the breech completely, the gun was laid aside. It was afterward ascertained that the difficulty came from the rust getting under and locking the breech-bolt spring.

JANUARY 14, 1873.

Fired at the special request of Mr. Joslyn.

VII. Nos. 1 and 2. Everything worked well.

No. 3. The cartridge-head blew into the extractor-recess. The gun was opened with the foot, and worked with difficulty afterwards.

VAN CHOATE.

DECEMBER 2, 1872.

The safety-test was complied with.

I. Nos. 1 and 2. Escape above and to the sides; the paper was torn to pieces.

No. 3. No escape.

The system was so clogged with gas as to work with great difficulty.

DECEMBER 3, 1872.

VI. After the first exposure it was found that the hammer would fall from the full-cock, wihout the trigger being touched. The action of the hammer was so much impeded that it repeatedly failed to explode the first cartridge tried. The arm was then set aside, to await further action by the full Board.

MILBANK, No. 50.

DECEMBER 4, 1872.

The safety-test was complied with.

I. Nos. 1 and 2. Strong escape above and on the right side.
No. 3. No escape.

II. Nine shots, besides one in the chamber not fired; 8 hits. As a rule, throughout the tests the shells were only partly withdrawn by the extractor, having to be picked out of the receiver with the fingers. In the excitement of firing, the operator's hand was badly pinched by the locking catch.

III. Fourteen shots.

IV. One hundred rounds were fired; 1 head burst, doing no harm.

DECEMBER 5, 1872.

Mr. Milbank withdrew his arm, partially tested yesterday, for alteration.

MILBANK, No. 51.

DECEMBER 4, 1872.

The safety-test was complied with. One cartridge-shell was not extracted on the first withdrawing of the bolt.

I. No. 1. Strong escape above and to the right, tearing the paper.
No. 2. Slight escape above and to the right.
No. 3. No escape.
Mr. Milbank having expressed his fears that in the test for rapidity with the service-cartridge the face of the breech-bolt, not being concave, might strike the fulminate with sufficient force to explode it, he was allowed to substitute for it a brass cartridge with the Milbank recessed primer. It having been discovered that the point of the firing-pin projected beyond the face of the bolt, it was ordered to be filed off.

II. Two shots; 2 missed but went on second trial; 9 hits.

III. Fifteen shots; 4 missed fire; 3 went on second trial; 1 failed under the prick-punch.

DECEMBER 5, 1872.

IV. One hundred rounds were fired; the ejector often failed to throw out the shells. Two heads burst, doing the piece no harm; their yielding was due to two large cavities in the face of the breech-bolt, into which the copper was blown. The gun was then set aside to await further action by the full Board.

JANUARY 28, 1873.

Returned, having been changed since December 5 by removing the latch on the handle, and by fitting the counter-bore to the service-cartridge.

The test was resumed at the fourth test.

IV. The test was completed. The empty shells were not always ejected, and the bolt occasionally moved with difficulty.

V. The arm opened and worked hard throughout. The safety-latch in rear of the guard-bow moved stiffly, and interfered with the ready firing of the piece.

FEBRUARY 1, 1873.

II. The arm worked better than before.
VI. Very rusty inside; only opened by continual pounding with a hammer. Worked with the same difficulty during the firing. The sear was rust-bound, so that the bolt would sometimes close without cocking the piece. After firing 15 rounds the test was suspended and the gun laid aside.

STETSON MAGAZINE.

Using special Berdan brass cartridges, 55 grains powder, 300 grains lead.

DECEMBER 4, 1872.

The safety-test was complied with.
I. No. 1. Strong escape to the right, tearing the paper.
No. 2. Strong escape to the right; the shell had to be driven out with the rammer.
No. 3. No escape.
II. Sixteen shots, besides one in the chamber not fired; 7 hits.
III. Twenty-four shots, besides one in the chamber not fired.
Display.—By Mr. Stetson. Twenty-six shots; 2 dropped in loading; 1 missed fire, which failed under the prick-punch.
The arm was decided by the Board as being of a model unsuited for the military service, and was consequently set aside for consideration by the full Board. (See Records.)

LEE, No. 53.

DECEMBER 4, 1872.

The safety-test was complied with.
I. No. 1. Escape above in front.
No. 2. Strong escape above in front.
No. 3. No escape; the gun opened hard.
II. Thirteen shots, besides one in chamber not fired; 11 hits.
III. Sixteen shots; 2 dropped in loading. The extractor worked badly; the arm frequently had to be tipped in order to shake out the empty shell. The contracted front of the mouth of the receiver-well, besides rendering it inconvenient to load, cut the firer's hand on its projecting corners.

DECEMBER 5, 1872.

Display.—By the employé, using Berdan brass cartridges; 18 shots.
Mr. Lee withdrew his arm partially tested yesterday.

LEE, No. 54.

Cal. 45. Using brass Berdan-Egyptian ammunition.

DECEMBER 5, 1872.

The safety-test was complied with.

I. No. 1. A strong escape above directed backwards; paper torn.
No. 2. A very strong escape above directed backwards; paper torn.
No. 3. No escape.

II. Eighteen shots, besides one in the chamber not fired; 10 hits.

III. Twenty-two, besides one in the chamber not fired.

DECEMBER 6, 1872.

IV. One hundred rounds were fired, when the test was suspended in consequence of the defective character of the ammunition, Mr. Lee deciding to change his arm to fire the service-cartridge.

EARNEST.

JANUARY 8, 1873.

The safety-test was complied with; the gun opened very hard after almost every shot. This was found due to the projection of the firing-pin, which prevented the swinging of the block. The agent was allowed an opportunity to correct it, and fired three shots more, the gun working as before. He then withdrew the arm to re-enter it Tuesday next.

JANUARY 30, 1873.

The first cartridge tried missed fire twice. The agent then altered the projection of the firing-pin. The second cartridge tried failed as before, the impression from the point of the firing-pin being very faint. It was then discovered that the hammer in falling struck slightly the paper placed to observe the escape of gas. This having been corrected the test was continued as follows:

I. Nos. 1 and 2. Escape above and in front.
No. 3. Slight escape above and in front.
On examining the piece after the test the extractor was found stuck by the fouling so that the breech-block would not readily close. Owing to the severity of the weather the second and third tests were postponed.

IV. During the first 26 shots 1 cartridge failed five times, but exploded afterwards under the prick-punch; towards the last the block stuck so in opening that the test was suspended, and the arm withdrawn by the agent.

PEABODY.

DECEMBER 18, 1872.

Display.—Mr. Peabody exhibited a gun so arranged as to direct the escape from defective cartridges upwards instead of diagonally backwards, as in the arm previously exhibited. This was tried as follows:

I. No. 1. Strong escape above along line of receiver, tearing the paper.

No. 2. Same, with a slight escape below.
No. 3. No escape.
A paper was held vertically directly in rear of the receiver.
1. No escape of gas; the cartridge-head was not cut completely through.
Same placed on right side of receiver, leaning slightly over it. Escape of gas along line of receiver.
Display.—By Mr. Wentworth, firing from the shoulder.
II. Twenty-five shots, besides one dropped in loading, and one in chamber not fired.
III. Firing from the hip as usual; 29 shots.

WARD-BURTON.

DECEMBER 18, 1872.

Display.—General Ward exhibited a Ward-Burton musket, with a broken mainspring, which fired successfully 10 shots; he then removed the sear-spring, substituting for it a finger of the left hand. The gun was also fired without a stock or guard, substituting for the sear a wooden pin.

WHITNEY CARBINE, No. 77.

FEBRUARY 5, 1873.

Display.—As a display-test 50 rounds were fired. As a rule the cartridge-shells extracted hard. The corners of the breech-block were so sharp as to cut the hand in working it. The arm was withdrawn for change in this respect.

MERRILL, No. 83.

FEBRUARY 28, 1873.

The safety-test was complied with.
I. Nos. 1 and 2. Escape of gas above.
No 3. Slight escape above. The first cartridge tried under the second test missed fire three times, but afterwards went under the prick-punch.
II. Thirteen shots, 9 hits; the gun opening very hard after each shot.
III. Ten shots; the gun opening with greater difficulty than before. The piece was then withdrawn for alteration.

GARDNER MAGAZINE, No. 87.

APRIL 7, 1873.

I. The number of shots fired in one minute, using the gun as a single-loader, the magazine being full and cut off. The test was suspended from the imperfect working of the magazine stop-spring.

II. Using the gun as a single-loader, from the shoulder, in 1 minute 16 shots were fired.

III. Starting with magazine loaded and one charge in chamber, 9 shots in 8½ seconds.

IV. Time to fire 3 magazines of 9 shots each, starting with the magazine full, including the time required to load the magazine twice, 27 shots in 1 minute 3 seconds; the first 9 in 6 seconds; the stop-spring failed once to stop the cartridge from flying back in loading.

V. Three shots, 2 from magazine and 1 in chamber, were fired in 1 second.

II.—SUPPLEMENTARY SERIES.

The supplementary tests were applied to the following arms, in accordance with the resolution of January 30, 1873:

PEABODY, No. 63.

FEBRUARY 21, 1873.

I. After each exposure it opened and worked easily.

FEBRUARY 26, 1873.

II. Opened and worked well throughout.

FEBRUARY 27, 1873.

III. The arm was in working order.

WHITNEY CARBINE, No. 77.

FEBRUARY 21, 1873.

I. After first exposure it was opened and worked well. After second exposure it was opened and worked with difficulty. After firing it it could only be opened by striking it with a stick. After the trial was completed it was casually noticed, in preparing the gun for the rust-test, that the breech could not be opened without taking the gun apart.

FEBRUARY 26, 1873.

II. Had to be opened with the foot; the arm was then fired 5 shots. After three unsuccessful attempts to fire the first excessive charge

the gun was oiled. After firing it was opened with a mallet. The second excessive charge blew the breech open above half an inch, after which it was observed that if in closing the breech the trigger was accidentally touched the hammer would follow up the block and fall upon the firing-pin.

FEBRUARY 27, 1873.

III. The arm was in working order.

SPRINGFIELD-STILLMAN, No. 66.

FEBRUARY 21, 1873.

I. After each exposure it opened and worked easily.

FEBRUARY 26, 1873.

II. Opened and worked well throughout. The heads of both shells used in the excessive charges blew off, causing the block to open rather hard after the second one had been fired.

FEBRUARY 27, 1873.

III. The arm was in working order.

ELLIOT CARBINE, No. 80.

FEBRUARY 19, 1873.

I. After the first exposure worked hard, but without unusual aid. After second exposure worked well, except that some trouble was found in making the hammer stand at the full-cock; supposed to be due to the dust having packed in between the back of the hammer and the frame, or between the barrel and the face of the breech-block.

FEBRUARY 26, 1873.

II. Opened and worked easily during the firing of the 5 rounds, and after the test with excessive charges.

FEBRUARY 27, 1873.

III. The arm was in working order.

WARD-BURTON MAGAZINE-CARBINE, No. 58.

FEBRUARY 20, 1873.

I. It was first exposed with an empty magazine. Two of the shots afterward fired were loaded from the outside, and 2 taken from

the magazine. Everything worked well. After the second exposure the arm opened easily; the first 4 cartridges fired stuck from dust in the chamber, which could be seen but not removed, so that they had to be driven out with a rod. Several shots were immediately afterwards fired and extracted without difficulty. In casually trying the arm afterwards it was found so blocked by the dust that it could not be completely closed; on being taken apart this was found due to the stopping of the ejector-pin by the dust and gas.

FEBRUARY 26, 1873.

II. The principal parts of the mechanism opened and worked easily, but the follower was rusted in the magazine-tube, so that after various unsuccessful attempts on the part of the employé in charge to move it by natural means and by pressure with an ordinary ramrod, it was turned over to Mr. Keene, the agent of the gun. By spitting on it and rapping it with a hammer and rod he succeeded in starting the follower so that it could be pushed out of the way of the five cartridges with which the magazine was charged. In firing these the descent of the carrier, and hence the closing of the breech, was interfered with by the failure of the spring-hook at the mouth of the magazine to prevent the succeeding cartridges from protruding under the carrier. In each of the tests with excessive charges the cartridge-heads blew into the extractor-hole; in consequence the piece opened hard after the first charge had been fired. It was opened easily after firing the second charge.

FEBRUARY 27, 1873.

III. The arm was in working order.

UPDEGRAFF, No. 42.

FEBRUARY 20, 1873.

I. The second defective cartridge fired failed three times, but was fired by letting down the hammer on the firing-pin and striking it a blow with a stick. After dusting, it was opened after working at it for about ten minutes, but it would not move automatically as intended. After working at it for about twenty minutes a cartridge was inserted and fired after four attempts, the hammer striking on the half-cock notch in falling. Three more cartridges were fired with difficulty. After the second exposure it was tried to fire two defective cartridges in the manner above mentioned, but without success.

FEBRUARY 26, 1873.

I. In one the fulminate exploded without setting fire to the powder, the other went under the prick-punch.

II. Had to be opened with the hammer, a liberal application of oil having no beneficial effect after repeated working of the parts.

The piece was then dropped.

SHARPS', No. 5.

FEBRUARY 21, 1873.

I. After each exposure it opened and worked easily.

FEBRUARY 26, 1873.

II. It worked so hard that it had to be opened by blows with a hammer upon the block. Three shots out of the five missed fire, once owing to the accumulation of rust on the firing-pin. The extractor also worked hard. Before firing the excessive charges the mechanism was oiled. In firing the high charges everything worked well.

FEBRUARY 27, 1873.

III. The arm was in working order.

SPRINGFIELD, No. 69.

FEBRUARY 21, 1873.

I. After each exposure it opened and worked easily.

FEBRUARY 26, 1873.

II. Opened and worked well throughout. The head of the cartridge-shell blew off in firing the second of the excessive charges.

FEBRUARY 27, 1873.

III. The arm was in working order.

REMINGTON-RYDER, No. 67.

FEBRUARY 21, 1873.

I. After the first exposure it opened and worked easily. After second exposure, it was opened by working at it for about four minutes, but in closing the block the hammer would follow it up and fall on the firing-pin. Even then it could not be invariably opened, the locking-brace sear often failing to catch and withdraw the brace. It was also noticed that, in the event of a cartridge missing fire, the hammer could not be again snapped without withdrawing the cartridge and reloading it. One shot was fired by withholding the hammer with the thumb during the locking of the piece and then letting it go. The gun was then set aside.

FEBRUARY 26, 1873.

II. Force had to be applied with the foot in order to open the piece. It invariably occurred that in closing the block the hammer would follow up and fall upon the firing-pin. This was in a measure corrected by partly dismounting the mechanism, and the application of a little oil to the neighborhood of the sear-fly, but even with

this aid the sear would not always automatically sustain the hammer at the full-cock. Oil was then poured into the mechanism through the trigger-slot in the guard-strap, without any perceptible remedial effect until the piece had been standing for about five hours, when it was tried and found to work quite freely.

FEBRUARY 27, 1873.

III. Was opened with difficulty by pounding with a hammer on the point of the firing-pin, so as to allow the retractor to move. The arm was therefore dropped.

RUSSIAN-BERDAN, No. 57.

FEBRUARY 20, 1873.

I. The gun opened and worked very hard after each exposure, although not requiring any unusual aid. The shells in every case had to be driven out with a rod.

FEBRUARY 26, 1873.

II. It had to be opened with a hammer before firing and after every shot. The excessive charges did not affect it, except as to the difficulty in opening, which continued, although the piece had been oiled.

FEBRUARY 27, 1873.

III. The arm was in working order.

FREEMAN, No. 76.

FEBRUARY 20, 1873.

I. After first exposure the gun opened and worked hard. It worked more freely after second exposure.

FEBRUARY 26, 1873.

II. Owing to the rusting forward of the firing-pin, and its indentation in the cork placed in the chamber to prevent the entrance of the oxidizing solution, the block could only be opened by the aid of a hammer. After firing the last of the five shots, the block was closed with difficulty, owing to the obstruction caused by the point of the extractor, which was stuck by the rust. The piece was oiled after three unsuccessful attempts had been made to fire the first charge. After firing it was opened with the foot, and after the second charge it required the aid of the hammer.

FEBRUARY 27, 1873.

III. The arm was in working order.

DEXTER, No. 38.

FEBRUARY 19, 1873.

I. After the first exposure it was opened with great difficulty after working at it for about five minutes, the hammer being snapped and the lever sharply rapped in order to free the piece of dust. After firing six shots the same trouble, in a less degree, was found. After the second exposure the sear was interfered with by the dust so as to prevent the fall of the hammer until several attempts to pull it off had been made.

FEBRUARY 26, 1873.

II. Had to be opened with the hammer. After firing five shots it had to be oiled in order to fire the excessive charges, the first of which opened the front joint of the side-plate about $\frac{2}{100}$ inch, and blew off the cartridge-head. The second also blew off the cartridge-head and separated the joint still more.

FEBRUARY 27, 1873.

III. The arm was in working order.

LEE, No. 61.

FEBRUARY 21, 1873.

I. After first exposure one cartridge snapped twice before firing. After second exposure everything worked well.

FEBRUARY 26, 1873.

II. It opened and worked well until tried with the first of the excessive charges, the effect of which, besides blowing off the cartridge-head, was to throw down the block about half an inch, breaking both branches of its lever-arm and the horizontal arm of the extractor. The arm was then dropped.

ROBERTS, No. 2.

FEBRUARY 20, 1873.

I. After the first exposure opened easily, but could not be latched by cocking the hammer, and after the second and third shots only by using the foot. After the second exposure the arm could not be made to close either when loaded or empty. It was then set aside.

FEBRUARY 26, 1873.

II. Worked stiffly at first, but otherwise worked well throughout.
III. The arm was in working-order.

REMINGTON LOCKING-RIFLE, No. 82.

FEBRUARY 21, 1873.

I. After each exposure it opened and worked well.

FEBRUARY 26, 1873.

II. Force had to be applied with the foot in order to open the piece; the mechanism at first moved imperfectly, but after working the hammer to and fro it performed its functions more satisfactorily. Five shots were fired without trouble. The piece had to be opened with the foot after each of the excessive charges.

FEBRUARY 27, 1873.

III. The arm was in working order.

WINCHESTER, No. 78.

FEBRUARY 28, 1873.

I. After the first exposure the utmost exertion in working the lever and other parts failed to clear the piece of dust sufficiently for movement of the carrier.

The arm was then dropped.

BROUGHTON, No. 79.

FEBRUARY 21, 1873.

I. After first exposure opened hard, though without great difficulty; the first cartridge was snapped four times, and the other three, twice each before firing. The gun opened hard after the first defective cartridge. After second exposure it opened as before; the second cartridge was snapped twice to fire it.

FEBRUARY 26, 1873.

II. Opened easily. The jar of closing the block would occasionally cause the hammer to fall. The firing-pin was stuck so fast with the rust that it would not latch the block in closing; its point projected after each discharge, and was with difficulty pried back into a safe position for loading. The fourth cartridge missed fire once; the others were fired without difficulty. After each of the excessive charges the gun had to be opened by striking the latch with a hammer.

FEBRUARY 27, 1873.

III. Opened hard. The point of the firing-pin projected, and could only be started by dismounting the block and driving it back with a hammer. As the fixed protrusion of the firing-pin rendered possible an explosion of the cartridge before the breech was locked, the arm was dropped.

SHARPS', No. 81.

A new arm not yet tried, selected by the Board as presumably the best representative of the system.

FEBRUARY 19, 1873.

I. After first exposure opened very hard, and also after the second two defective cartridges had been fired. After second exposure the gun opened very hard; the difficulty was so much increased by firing the first cartridge that on applying force to the lever with the foot it was broken off about 2½ inches from the end. On examination by an expert this was declared due to overheating of the metal in manufacture. The arm was then laid aside. The cartridge-shell was easily removed from the chamber by tapping on the projection of the extractor, showing that the resistance was not due to the sticking of the shell.

REMINGTON NAVY-RIFLE, No. 85.

FEBRUARY 28, 1873.

I. After the first exposure the piece worked well. After the second exposure the friction-lever failed to keep the block closed, so that it would fall backward and catch the hammer in falling. The extraction was very imperfect, requiring all the force of the firer to withdraw the shell.

MARCH 4, 1873.

II. Opened and worked stiffly. The firing-pin was rusted forward, and had to be pressed back with a nail. The two excessive charges were fired, everything working well.

MARTINI.

FEBRUARY 28, 1873.

Owing to scarcity of ammunition the piece was fouled by flashing a pinch of powder in the mechanism.

I. After the first exposure the arm worked stiffly. It pulled off very hard; the extraction was imperfect, the shell being pulled out with great difficulty with the fingers after the extractor had just started it out of the chamber. The piece would not remain open after the lever was depressed. After being again fouled as before it was exposed a second time to the dust, after which it opened very stiffly. One shot was fired, but in trying it afterwards it was found that the tumbler would follow up the motion of the block in closing.

By much working of the parts they performed their functions more properly, though moving stiffly meanwhile.

MARCH 4, 1873.

II. Opened and worked very stiffly, the tumbler invariably following the movement of the lever in closing. The piece was then dropped as disabled by the rust.

WERNDL.

FEBRUARY 28, 1873.

Fouled as before by flashing powder in the receiver.

I. After the first exposure the piece opened easily. Three shots were then fired, but extracted with great difficulty by pounding on the handle with a hammer. After the second exposure the gun was disabled, the handle of the block having to be pounded with a hammer in order to move it either way. The gun was then dropped.

III.—FINAL SERIES.

With muskets using the new cartridge, cal. .45.

Trials for rapidity, made in accordance with the following resolution adopted April 8, 1873:

That the comparative rapidity of fire of each gun shall be determined by taking the average time of five successive trials, which shall be made by the same individual, at intervals of twenty minutes, and which shall consist of firing, with aim, from service-cartridge box No. 2, suspended from the waist-belt, 24 cartridges, of cal. .45.

The guns to be tested at the rate of one each working-day, and in the following order, determined by lot, viz:

No. 1, Elliot; No. 2, Peabody; No. 3, Springfield; No. 4, Remington; No. 5, Freeman; and the alteration of the Ward-Burton magazine-gun when completed.

Prior to the adoption of the foregoing, the following preliminary tests were made, firing with aim, and taking the cartridges from the table:

PRELIMINARY TESTS.—APRIL 4, 1873.

ELLIOT, No. 80.

Ten cartridges were fired, when one cartridge jammed the block so that it could not be closed, nor could it be easily opened for the removal of the cartridge and its replacement by another. On a second trial two shots were fired, when the same trouble was discovered, which again arose on a further test.

REMINGTON, No. 86.

Trouble was found in firing, from the incomplete closing of the block the hammer striking against it in its fall. This was due to variation in the cartridge-heads, preventing the complete closing of the block.

REMINGTON, No. 85.

Twenty-one shots in 1 minute; 2 cartridges missed fire; 1 went on second trial, and 1 on third trial.

FREEMAN, No. 76.

Eighteen shots in 1 minute. Block stuck hard in closing once.

SPRINGFIELD, No. 88.

Nineteen shots in 1 minute.

PEABODY, No. 63.

Nineteen shots in 1 minute.

TESTS FOR RAPIDITY.

ELLIOT, No. 80.

April 9, 1873.

First trial: 24 shots in 1 minute 24½ seconds; 2 shells failed to eject.
Second trial: 24 shots in 1 minute 25 seconds; 2 shells failed to eject.
Third trial: 24 shots in 1 minute 16 seconds; 2 shells failed to eject.
Fourth trial: 24 shots in 1 minute 24 seconds; 2 shells failed to eject.
Fifth trial: 24 shots in 1 minute 14 seconds; 1 shell failed to eject.
Average, 1 minute 21½ seconds.
At the rate of 17.7 shots per minute.

SPRINGFIELD, No. 88.

April 10, 1873.

First trial: 24 shots in 1 minute 32½ seconds.
Second trial: 24 shots in 1 minute 33 seconds.
Third trial: 24 shots in 1 minute 38 seconds.
Fourth trial: 24 shots in 1 minute 30 seconds.
Fifth trial: 24 shots in 1 minute 29 seconds; 1 cartridge missed fire twice.
Average, 1 minute 32.5 seconds.
At the rate of 15.65 shots per minute.

SPRINGFIELD, No. 88.

With new mainspring.

April 16, 1873.

First trial: 24 shots in 1 minute 28 seconds; 1 cartridge missed fire once.
Second trial: 24 shots in 1 minute 28½ seconds.
Third trial: 24 shots in 1 minute 28½ seconds.

Fourth trial: 24 shots in 1 minute 23½ seconds.
Fifth trial: 24 shots in 1 minute 23½ seconds.
Average, 1 minute 25.6 seconds.
At the rate of 16.82 shots per minute.

REMINGTON, No. 86.

April 14, 1873.

First trial: 24 shots in 1 minute 22 seconds.
Second trial: 24 shots in 1 minute 11 seconds.
Third trial: 24 shots in 1 minute 11 seconds; 1 cartridge dropped in loading.
Fourth trial: 24 shots in 1 minute 11 seconds.
Fifth trial: 24 shots in 1 minute 9 seconds.
Average, 1 minute 12.8 seconds.
At the rate of 19.78 shots per minute.

FREEMAN, No. 76.

April 15, 1873.

First trial: 24 shots in 1 minute 27 seconds; 1 cartridge missed fire once, 1 was thrown back by the force of the ejector-spring in loading, and consequently dropped on the floor.
Second trial: 24 shots in 1 minute 47 seconds; 3 cartridges were thrown back as before and dropped.
Third trial: 24 shots in 1 minute 30 seconds; 1 cartridge failed to be ejected; 2 stuck hard in opening.
Fourth trial: 24 shots in 1 minute 29 seconds.
Fifth trial: 24 shots in 1 minute 22 seconds.
Average, 1 minute 29.8 seconds.
At the rate of 16.03 shots per minute.

PEABODY, No. 63.

April 21, 1873.

First trial: 24 shots in 1 minute 22 seconds.
Second trial: 24 shots in 1 minute 19 seconds.
Third trial: 24 shots in 1 minute 15 seconds.
Fourth trial: 24 shots in 1 minute 14 seconds.
Fifth trial: 24 shots in 1 minute 17 seconds.
Average, 1 minute 17.4 seconds.
At the rate of 18.6 shots per minute.

WARD-BURTON MAGAZINE-MUSKET, No. 97.

April 22, 1873.

The Ward-Burton magazine-musket as a single loader. In working this arm before the actual test was begun, the thumb-piece of the slide-stop or cut-off was broken off, so that the arm could not be tried with the magazine charged and in reserve.
First trial: 24 shots in 1 minute 12 seconds.
Second trial: 24 shots in 1 minute.
Third trial: 24 shots in 1 minute 3 seconds.
Fourth trial: 24 shots in 57 seconds; 1 miss-fire, from an insufficient quantity of fulminate.

Fifth trial: 24 shots in 1 minute 2 seconds; 2 miss-fires.
Average, 1 minute 2.8 seconds.
At the rate of 22.92 shots per minute.

April 23, 1873.

Time required to fire three magazinefuls, starting with 7 cartridges in the magazine and 1 in the chamber, including the time required to charge the magazine twice, the cartridges being placed in rows of 7 each in a block lying on the table, 22 shots in 63 seconds. The first two magazines were emptied in 12 seconds.

In the first round, from the excessive rapidity of the motion, one cartridge jammed in entering the chamber, and was thrown out without being fired. In each of the last 2 rounds 1 cartridge missed fire, the quantity of fulminate being insufficient to ignite the charge. One round of 8 shots was fired in 9½ seconds; 1 cartridge jamming as before. This test was consequently repeated, giving the same result, 8 shots in 9½ seconds.

Lieut. METCALFE'S DETACHABLE MAGAZINE.

Time required to fire 10 shots, caliber .45, from Lieutenant Metcalfe's detachable magazine, fixed upon the gun and open, 33 seconds: At the rate of 18.5 shots per minute.

ELLIOT'S MAGAZINE CARTRIDGE-BOX.

Time required to fire 24 shots from Dr. Elliot's magazine cartridge-box, caliber .45, using the Springfield arm, 1 minute 32 seconds; the first 10 shots being fired in 40 seconds. The same test was started, using the Elliot arm, but was suspended from a failure in extraction, requiring the use of the rammer to drive out the empty shell. Using the Remington arm, 24 shots were fired in 1 minute 37 seconds. When about half emptied, the weight of the remaining cartridges, overcoming the resistance of the pawl, would cause the block to revolve backwards and carry them out of reach.

RAPIDITY OF FIRE BY ENLISTED MEN.

April 24, 1873.

The men having been familiarized by the expenditure of three cartridges, the regular firing was conducted by each man in turn, firing from each of the guns 12 shots, taken from the cartridge-box used in the preceding experiments. The firers had an opportunity to rest between the trials, during the use of the same gun, or of the succeeding one, by their comrades. The trial in one party with each gun was completed before the next one was taken up, giving the gun a chance to cool before it was fired again.

The imperfect ejection of the Elliot gun caused it to be dropped soon after the firing had begun.

Time to fire the following guns, rounds of 12 shots each.

Man's name.	Freeman.	Peabody.	Remington.	Springfield.	Ward-Burton.	Aggregate.	Average.
	m. s.	*m. s.*	*m. s.*	*m. s.*	*m. s.*	*m. s.*	*m. s.*
Old soldiers. Dumont	0 47	1 18	0 57	(1*d*) 1 0	0 51	4 53	0 53 3/5
Parker	(1 *d*) 54	1 3	52	55	1 0	4 44	56 4/5
Taylor	1 0½	1 1	1 2	1 6	(1 *d*) 56	5 5½	1 1/10
Hammon	1 2½	1 28½	49	(1*d*) 1 7	47	5 14	1 2 4/5
Temple	1 7	1 11½	56½	1 2½	*1 23	5 40½	1 8 1/10
Aggregate	4 51	6 2	4 36½	5 10½	4 57	25 37	.....
Average	58 1/5	1 12 2/5	55 3/10	1 2 1/10	0 59 2/5	.....	.....
Shots per minute	12.37	9.94	13.02	11.59	12.12	.....	.....
Order in rapidity	2	5	1	4	3	.....	.....
	m. s.	*m. s.*	*m. s.*	*m. s.*	*m. s.*	*m. s.*	*m. s.*
Recruits. Anderson	1 13	1 8	1 2	1 15	1 10	5 48	1 9/5
August	1 7	1 20	1 20	1 26	51	6 4	1 12/5
Flannagan	1 28	1 40	1 11	1 47	1 3	7 9	1 25/5
Brady	1 16	1 16	59	1 11	1 1	5 43	1 8/5
Thies	1 5	1 38	1 25	1 24	1 10	6 42	1 20/5
Aggregate	6 9	7 2	5 57	7 3	5 15	31 26	.....
Average	1 13 4/5	1 24 2/5	1 11 2/5	1 24 3/5	1 3	.....	.....
Shots per minute	9.75	8.53	10.08	8.51	11.43	.....	.....
Order in rapidity.	3	4	2	5	1	.....	.....

* Two misfires, which exploded on second trial.

NOTE.—(1 *d*) signifies that one cartridge was dropped in loading.

SPRINGFIELD, No. 99.

APRIL 29, 1873.

First trial: 24 shots in 1 minute 20 seconds.
Second trial: 24 shots in 1 minute 10.5 seconds.
Third trial: 24 shots in 1 minute 7 seconds.
Average, 1 minute 12.5 seconds.
At the rate of 19.86 shots per minute.

ELLIOT, No. 80.

MAY 3, 1873.

Private Henck, orderly to the Board, fired 24 shots in 1 minute 57 seconds: at the rate of 12.3 shots per minute.

Repeated as before, 24 shots in 1 minute 43 seconds: at the rate of 14 shots per minute.

SPRINGFIELD, No. 99.

MAY 3, 1873.

Private Henck fired 24 shots in 1 minute 32 seconds: at the rate of 15 6 shots per minute.

Lieut. METCALFE'S DETACHABLE MAGAZINE

MAY 3, 1873.

With Lieutenant Metcalfe's detachable magazine tied on the gun, R. T. Hare fired 10 shots in 25 seconds: at the rate of 24 per minute.

Repeated, 9 shots in 23 seconds: at the rate of 23.5 per minute.

From .50 cal. cartridge-box fired 10 shots in 28 seconds: at the rate of 21.4 per minute.

ELLIOT, No. 80.

MAY 3, 1873.

Time required to fire 12 rounds, by the following party of old soldiers, from the Elliot gun No. 80:

1. Dumont, 1 minute 5 seconds.
2. Taylor, 1 minute 20 seconds; 1 dropped and 1 stuck in extracting.
3. Parker, 58 seconds.
4. Hammer, 1 minute 10 seconds.
5. Gamble, 1 minute 4 seconds.

Average, 1 minute $7\frac{2}{5}$ seconds: at the rate of 10.6 per minute.

Time required to fire 12 rounds, by the following party of recruits, from the Elliot gun No. 80:

1. Dike, 1 minute 5 seconds.
2. Hosmer, 1 minute 35 seconds.
3. Turney, 58 seconds.
4. Wilson, 1 minute.
5. Quill, 1 minute 27 seconds.

Average, 1 minute 13 seconds: at the rate of 9.8 per minute.

SPRINGFIELD, No. 99.

MAY 3, 1873.

Time required to fire 12 rounds, by the following party of new soldiers, from the Springfield No. 99:

1. Dike, 1 minute 15 seconds.
2. Hosmer, 1 minute 27 seconds.
3. Turney, 1 minute 22 seconds; 1 dropped.
4. Wilson, 1 minute 5 seconds.
5. Quill, 1 minute 45 seconds.

Average, 1 minute $28\frac{4}{5}$ seconds: at the rate of 8.6 per minute.

INDEX TO SYNOPSIS OF EXPERIMENTAL TESTS.

NOTE.—Some of the arms at first received were not referred to by their docket numbers, since they were then supposed to be the only ones of their name. When other arms of the same origin were afterward received, they were distinguished by reference to their numbers on the docket, *e. g.*, "Springfield," p. 71, and "Springfield, No. 69," p. 93, &c.

Arms.	Regular tests.		Supplementary tests.	Final tests.
	Complete.	Incomplete.		
	Page.	*Page.*	*Page.*	*Page.*
Remington, No. 19	62			
Remington, No. 20	63			
Remington, No. 21	63			
Remington, No. 22	64			
Remington, No. 23		80		
Remington, No. 43	65			
Remington-Ryder, No. 67	76		93	
Remington locking-rifle, No. 82			96	
Remington navy-rifle, No. 85			97	99
Remington, No. 86				98, 100
Roberts, No. 2		80	95	
Roberts, No. 64	75			
Robertson, No. 35		83		
Sharps, No. 5	61		93	
Sharps, No. 81			97	
Smoot, No. 32	66			
Spencer, No. 30		83		
Springfield, No. 48	71			
Springfield, No. 69			93	
Springfield, No. 88				99
Springfield, No. 99				102, 103
Springfield-Allin, No. 68	73			
Springfield-Stillman, No. 66	76		91	
Stetson magazine, No. 52		87		
Thomas, No. 44		81		
Updegraff, No. 42	69		92	
Van Choate, No. 34		85		
Ward-Burton, No. 26	71	89		
Ward-Burton magazine-carbine, No. 58	77		91	
Ward-Burton magazine-musket, No. 97				100
Werndl			98	
Winchester magazine-musket, No. 78	79		96	
Whitney, No. 11	70			
Whitney, No. 13	70			
Whitney, No. 77		89	90	

III.

ABSTRACT OF MONTHLY REPORTS FROM THE ARMY

ON THE

EXPERIMENTAL BREECH-LOADING MUSKETS AND CARBINES.

MAY, 1871, TO MARCH, 1873.

1.—CAVALRY.
2.—ARTILLERY.
3.—INFANTRY.

A.—SUB-ABSTRACT OF PREFERENCES.
B.—SUB-ABSTRACT OF BROKEN PARTS AND MISS-FIRES.
C.—RECAPITULATION.

ABSTRACT OF MONTHLY REPORTS.

OFFICE OF THE BOARD ON BREECH-LOADING SMALL-ARMS,
National Armory, Springfield, Massachusetts, May 18, 1873.

SIR: I have the honor to forward to-day, by express, Addendum III of the report of the Board for selecting a breech-loading system for muskets and carbines.

It is believed that this will give in a concise form the sense of the Army as to the comparative merits of the weapons in their hands for trial, both voluntarily expressed by their preferences, and involuntarily shown by the collated mass of the accidents of service, and of the miss-fires occurring in the different kinds of arms. From the former class (Sub-abstract A) have been excluded expressions of opinion by officers whose commands were armed with but one kind of weapon, as it was believed that their reports, though interesting, were not comprised among those called for by the circular letter from the Ordnance Office dated March 10, 1871.

Special attention is invited to the recapitulation, (Sub-abstract C) in which the preceding information has been reduced to a standard common to the different arms, a comparison between which would otherwise, from their varied numbers and times of service, have been impracticable. The irregular and defective rendering of the monthly reports, in some instances, has doubtless affected more or less the accuracy of the conclusions to be derived from them, but still, this error being a common one, it is believed that the comparisons indicated are in the main trustworthy.

Accompanying the abstract, in a separate box, will be found the original reports from the field from which this information was obtained.

Very respectfully, your obedient servant,

HENRY METCALFE,
Second Lieutenant Ordnance, Recorder.

The Hon. the SECRETARY OF WAR,
(Through the Adjutant-General U. S. A.) Washington, D. C.

[First indorsement.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, May 20, 1873.

Respectfully referred to the Chief of Ordnance, in connection with papers on the same subject transmitted on the 17th instant.

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

The succeeding information was compiled from the answers made to the following questions, in accordance with the circular dated Ordnance Office, March 10, 1871, by officers having issued to them for trial the different models of experimental arms, viz:

1. Number, kind, and caliber of arms in company.
2. Number of each kind rendered unserviceable, (included in question No. 3.)
3. Number and names of parts of each of the above kinds which have broken or become unserviceable during the month.
4. What modifications or improvements do you suggest for each arm?
5. Number and kinds of musket-cartridges fired from each kind of arm, and number of failures in each arm.
6. Which of the four systems of breech arrangement would you prefer for uniform use in the rifle muskets and carbines of the military service?

1.—ABSTRACT OF THE MONTHLY REPORTS RECEIVED FROM THE CAVALRY.

Company A, First Cavalry, Captain Thomas McGregor commanding; Remington, Springfield, and Sharps carbines issued July 1, 1871; *Ward-Burton carbines issued August* 9, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Sept	Remington, at full-cock	29	1 rear-sight	Should load at half-cock	400	7	Sharps	
	Springfield	25	None reported	No remark	300	8		
	Sharps	25	1 ejector-spring	do	300	5		
Oct	Remington, at full-cock	29	None reported	Should load at half-cock	156	5	Sharps	
	Springfield	25	do	No remarks	100	3		
	Sharps	25	do	do	100	1		
Nov	Remington, at full-cock	29	1 mainspring, 1 trigger-spring, 1 lever-spring.	Should load at half-cock	150	3	Springfield	Lieut. Thomas Garvey, commanding.
	Springfield	25	1 ejector-spring, 1 cam-latch spring, 1 mainspring, 1 tumbler-screw.	No remarks	100	1		
	Sharps	25	1 lever-spring, 2 tumbler-screws	do	100			
Dec	Remington, at full-cock	29	1 firing-pin screw	Should load at half-cock	150	4	Springfield	
	Springfield	25	1 firing-pin spring, 1 firing-pin screw.	No remarks	100	2		
	Sharps	25	None reported	Does not eject well after firing in a dusty country.	100	1		
1872.								
Jan	Remington, at full-cock	29	1 firing-pin, 1 firing-pin spring	Should load at half-cock			Springfield	
	Springfield	25	1 B. B. cap-screw, 1 firing-pin, 1 sear.	No remarks				
	Sharps	25	None reported	Does not eject well after firing in a dusty country.				
Feb	Remington, at half-cock	20	do	Does not eject shells well	100		Springfield	
	Remington, at full-cock	9	2 firing-pin springs	Should load at half-cock				
	Springfield	25	2 B. B. cap-screws, 2 sear-springs, 2 ejector-springs.	No remarks	200			
	Sharps	25	1 mainspring, 2 sear-springs	Does not eject well after firing in a dusty country.	100			
March	Remington, at half-cock	20	None reported	Does not eject shells well	200	1	Springfield	
	Remington, at full-cock	9	do	Should load at half-cock				
	Springfield	25	do	No remarks	200	1		
	Sharps	25	2 sear-springs	Does not eject well after firing in a dusty country.	100	3		
April	Remington, at half-cock	20	None reported	Does not eject shells well	100	2	Springfield	
	Remington, at full-cock	9	do	Should load at half-cock				
	Springfield	23	do	No remarks	100	3		
	Sharps	25	do	Does not eject well after firing in a dusty country.	100	3		

Company A, First Cavalry, Captain Thomas McGregor commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
May	Remington, at half-cock	19	None reported	Does not eject shells well	200	10	Springfield	Lieut. M. Wesendorff, commanding.
	Remington, at full-cock	9	do	Should load at half-cock				
	Springfield	20	do	No remarks	300	18		
	Sharps	25	do	Does not eject well after firing in a dusty country.	100	7		
June	Remington, at half-cock	19	do	No remarks	300	3	Springfield	
	Remington, at full-cock	8	do	do				
	Springfield	23	do	do	100	4		
	Sharps	25	do	do	100	2		
July	Remington, at half-cock	19	do	do			Springfield	
	Remington, at full-cock	8	do	do				
	Springfield	22	do	do				
	Sharps	25	do	do				
Aug	Remington, at half-cock	19	do	do	100	3	Springfield	
	Remington, at full-cock	8	do	do				
	Springfield	20	do	do	100	2		
	Sharps	25	do	do	200	7		
Oct	Remington, at half-cock	19	1 barrel	do	100	2	Springfield	
	Remington, at full-cock	8	None reported	do				
	Springfield	21	1 front-sight, 1 stock	do	150	2		
	Sharps	25	None reported	do	100	1		
Nov	Remington, at half-cock	19	1 stock, 1 rear-sight	do	200	2	Springfield	
	Remington, at full-cock	8	3 stocks	do				
	Springfield	21	2 stocks, 1 barrel	do	100			
	Sharps	25	None reported	do	100	1		
Dec	Remington, at half-cock	19	do	do	150	2	Springfield	
	Remington, at full-cock	8	do	do				
	Springfield	21	do	do	100	1		
	Sharps	25	do	do	100	1		
	Ward-Burton	18	do	do				
1873.								
Jan	Remington, at half-cock	19	do	do	200	4	Springfield	
	Remington, at full-cock	8	do	do				
	Springfield	20	do	do	150	2		
	Sharps	25	do	do	200	3		
	Ward-Burton	18	do	Ward-Burton has not been subjected to field-service.	200			

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, at half-cock	20	1 barrel, 1 stock, 1 rear-sight	2,500	48
Remington, at full-cock	9	3 stocks, 1 rear-sight, 1 mainspring, 1 trigger-spring, 1 lever-spring, 1 firing-pin, 1 firing-pin screw, 3 firing-pin springs.		
Springfield	25	3 stocks, 1 front-sight, 1 barrel, 1 ejector-spring, 1 cam-latch spring, 1 mainspring, 1 tumbler-screw, 1 firing-pin spring, 1 firing-pin screw, 3 B. B. cap-screws, 1 firing-pin, 1 sear, 2 sear-springs, 1 ejector-spring.	2,100	47
Sharps	25	1 ejector-spring, 1 lever-spring, 2 tumbler-screws, 1 mainspring, 4 sear-springs	1,800	35
Ward-Burton	18	None reported	200	.....

Company I, First Cavalry, Lieutenant A. Grant commanding; Remington, Springfield, and Sharps carbines issued July 1, 1871.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
July	Remington, at half-cock	20	None reported	No remarks	100	.....	Springfield	
	Remington, at full-cock	4	do	Dangerous; recoil too great; extractor almost worthless				
	Springfield	28	do	No remarks	100	.....		
	Sharps	24	do	Model out of date; very troublesome to load; recoil very great.	100	.....		
Aug	Remington, at half-cock	20	1 tumbler	No remarks	270	.....	Springfield	
	Remington, at full-cock	3	1 stock	do				
	Springfield	24	None reported	do	270	.....		
	Sharps	24	do	do	270	.....		
Oct	Remington, at half-cock	14	5 rear-sights, 3 mainsprings	do	920	10	Springfield	
	Springfield	11	3 rear-sights	do				
	Sharps	20	None reported	do				
Nov	Remington, at full-cock	10	1 stock	do	232	6	Springfield	
	Springfield	14	None reported	do				
	Sharps	20	1 lock-plate	do				
Dec	Remington, at full-cock	14	None reported	do	150	.....	Springfield	
	Springfield	11	do	do				
	Sharps	20	do	do				

Company I, First Cavalry, Lieutenant A. Grant commanding—Continued.

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, at half-cock	20	1 tumbler, 5 rear-sights, 3 mainsprings	370	.....
Remington, at full-cock	4	2 stocks		
Springfield	28	3 rear-sights	370	.....
Sharps	24	1 lock-plate	370	.....

Company B, Second Cavalry, Lieutenant R. Norwood commanding.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. Sept	Sharps	76	2 stocks, 3 breech-straps	A reduced charge for cartridge; recoil very great.	2,020	40	Sharps	

Company C, Second Cavalry, Captain E. J. Spaulding commanding; Remington, Springfield, and Sharps carbines issued June 20, 1871; Ward-Burton carbines issued May 28, 1872.

1871. July	Remington, at half-cock	28	None reported	No remarks	.....	.....	Not given	
	Springfield	28	do	do	.....	.....		
	Sharps	28	do	do	.....	.....		
Aug	Remington, at half-cock	20	do		300	.....	Remington at half-cock.	
	Remington, at full-cock	8	do					
	Springfield	28	do		300			
	Sharps	28	do		200			
Sept	Remington, at half-cock	20	do	To have an ejector-spring; tip of front-sight to be nickel or brass.	1,336	220	Remington at half-cock.	
	Remington, at full-cock	8	do	No remarks				
	Springfield	28	do	do	1,336			
	Sharps	28	do	do	1,336			

Oct	Remington, at half-cock	20	do	To have an ejector-spring; tip of front-sight to be nickel or brass.	350	50	Remington, at half-cock.
	Remington, at full-cock	8	do	No remarks			
	Springfield	28	do	do	350	50	
	Sharps	28	do	do	350	50	
Nov	Remington, at half-cock	20	do	To have an ejector-spring; tip of front-sight to be nickel or brass.	200	20	Remington, at half-cock.
	Remington, at full-cock	8	do	No remarks			
	Springfield	28	do	do	200	20	
	Sharps	28	do	do	200	20	
Dec	Remington, at half-cock	20	do	To have an ejector-spring; tip of front-sight to be nickel or brass.			Remington, at half-cock.
	Remington, at full-cock	8	do	No remarks			
	Springfield	28	do	do			
	Sharps	28	do	Small of the stocks are too weak			
1872.							
Jan	Remington, at half-cock	20	do	To have an ejector-spring; tip of the front-sight to be nickel or brass.			Not given
	Remington, at full-cock	8	do	No remarks			
	Springfield	28	do	do			
	Sharps	24	do	Small of the stocks are too weak			
Feb	Remington, at half-cock	20	do	To have an ejector-spring; tip of the front-sight to be nickel or brass.			Remington, at half-cock.
	Remington, at full cock	4	do	No remarks			
	Springfield	26	do	do			
	Sharps	25	do	Small of the stocks are too weak			
March	Remington, at half-cock	20	do	No remarks			Remington, at half-cock.
	Remington, at full-cock	3	do	do			
	Springfield	26	do	do			
	Sharps	26	do	do			
April	Remington, at half-cock	20	do	do			Remington, at half-cock.
	Remington, at full-cock	3	do	do			
	Springfield	26	do	do			
	Sharps	26	do	do			
June	Remington, at half-cock	7	do	do	1,000		Remington, at half-cock.
	Remington, at full-cock	7	do	do			
	Springfield	17	do	do			
	Sharps	18	do	do			
	Ward-Burton	21	do	do			
July	Remington, at half-cock	7	do	do	300	6	Remington at half-cock.
	Remington, at full-cock	7	do	do			
	Springfield	17	do	do	150	3	
	Sharps	18	do	do	200	7	
	Ward-Burton	21	3 stocks	do	200		
Sept	Remington, at half-cock	5	2 stocks	do	1,000	10	Remington, at half-cock.
	Remington, at full-cock	5	do	do			
	Springfield	17	None reported	do			
	Sharps	17	1 stock	do			
	Ward-Burton	19	2 stocks	do			

Company C, Second Cavalry, Captain E. J. Spaulding commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. Oct ...	Remington, at half-cock	12	1 stock	Should have ejector to throw shells clear of barrel.	500	18	Springfield	Without any improvements prefers the Springfield. Small of stock should be strengthened in all the arms.
	Remington, at full-cock	2	None reported	No remarks				
	Springfield	17	1 stock, 1 barrel	do				
	Sharps	18	None reported	do				
	Ward-Burton	21	2 stocks	do				
Nov ...	Remington, at half-cock	11	1 stock	Should have ejector to throw shells clear of barrel.	120	3	Springfield	Same remarks as October.
	Remington, at full-cock	3	None reported	No remarks				
	Springfield	17	1 stock, 1 side-screw	do	130	5		
	Sharps	18	1 stock	do	125	6		
	Ward-Burton	21	None reported	Mainspring is too weak	125	9		
Dec....	Remington, at half-cock	12	1 stock	Should have ejector to throw shells clear of barrel.	500	14	Not given.	
	Remington, at full-cock	2	None reported	No remarks				
	Springfield	17	1 stock, 1 barrel	do				
	Sharps	18	None reported	do				
	Ward-Burton	21	2 stocks	Mainspring is too weak				
1873. Jan	Remington, at full-cock	7	None reported	Should load at half-cock	100		Remington, at full-cock.	
	Springfield	12	do	No remarks	210			
	Sharps	16	do	do	100			
	Ward-Burton	18	do	The small of the stock should be strengthened.	130			

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, at half-cock	20	5 stocks	2,470	111
Remington, at full-cock	8	2 stocks		
Springfield	28	3 stocks, 2 barrels, 1 side-screw	1,340	78
Sharps	28	2 stocks	1,175	83
Ward-Burton	21	9 stocks	455	9

Company E, Second Cavalry, Captain Elijah R. Wells commanding; Remington, Springfield, and Sharps carbines issued June 20, 1871, and the Ward-Burton arms issued May 27, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. Dec.	Remington, at half-cock.	20	2 barrels burst, 5 hammers, 3 mainsprings, 3 trigger-springs, 1 firing-pin, 1 firing-pin spring, 1 lever-spring.	Difficult to extract the shells after firing	3,700	.....	Sharps	* 2 per cent. lost.
	Remington, at full cock	8	1 butt-stock	No remarks				
	Springfield	27	2 barrels, 3 mainsprings, 1 cam-latch spring, 1 sear-spring, 2 tumbler-screws, 1 firing-pin, 1 firing-pin spring, 2 firing-pin screws, 3 ejector-springs.	do				
	Sharps	27	1 stock, 3 main-springs, 4 tumbler-screws, 1 tumbler, 2 firing-pins, 1 lever-spring.	Should be sighted more accurately				
1872. Mar.	Remington, at half-cock.	16	4 firing-pins, 3 firing-pin springs, 2 firing-pin screws, 1 lever-spring.	Difficult to extract the shells after firing	2,650	2 per ct.	Sharps	
	Remington, at full-cock	8	1 firing-pin, 1 firing-pin spring, 2 lever-springs.	No remarks				
	Springfield	25	1 stock, 1 lock, 3 tumbler-screws, 3 tumblers, 2 cam-latch springs.	do				
	Sharps	26	4 tumbler-screws, 1 lever-spring.	Should be sighted more accurately				
April	Remington, at half-cock.	16	None reported	No remarks	800	.....	Sharps	
	Remington, at full-cock	8	do	do				
	Springfield	25	do	The breech-block liable to open from jolting against the saddle.				
	Sharps	26	1 lock	No remarks				
May	Remington, at half-cock.	13	None reported	do	800	1 per ct.	Sharps	
	Remington, at full-cock	8	do	The Schofield hammer should be used				
	Springfield	24	do	The breech-block liable to open from jolting against the saddle.				
	Sharps	25	do	No remarks				
June	Remington, at half-cock.	13	do	Does not extract the shell properly	1,000	1 per ct.	Springfield	
	Remington, at full-cock	8	do	do				
	Springfield	24	do	For general service the Springfield is the best arm.				
	Sharps	25	do	Should be sighted more accurately				
	Ward-Burton	21	do	Too complicated for cavalry service				

Company E, Second Cavalry, Captain Elijah R. Wells commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
July	Remington, at half-cock	6	None reported	Does not extract the shell properly	1,104		Springfield	
	Remington, at full-cock	8	do	do				
	Springfield	16	1 stock	For general service the Springfield is the best arm.				
	Sharps	18	None reported	Should be sighted more accurately				
	Ward-Burton	21	do	Too complicated for cavalry service				
Aug	Remington, at half-cock	6	do	No remarks	1,104		Springfield	
	Remington, at full-cock	8	do	do				
	Springfield	16	do	do				
	Sharps	18	do	do				
	Ward-Burton	21	do	do				
Sept	Remington, at half-cock	6	do	Does not extract the shell properly	1,024		Springfield	See special report.
	Remington, at full-cock	8	do	do				
	Springfield	16	do	For general service the Springfield is the best arm.				
	Sharps	18	do	Should be sighted more accurately				
	Ward-Burton	21	do	Too complicated for cavalry service				
Oct	Remington, at half-cock	6	None reported	Does not extract the shells properly	480		Springfield	See special report.
	Remington, at full-cock	8	1 rear-sight	do				
	Springfield	16	1 stock	For general service the Springfield is the best arm.				
	Sharps	18	2 stocks	Should be sighted more accurately				
	Ward-Burton	21	None reported	Too complicated for cavalry service				
Nov	Remington, at half-cock	6	do	Does not extract the shells properly			Springfield	See special report.
	Remington, at full-cock	6	do	do				
	Springfield	12	do	For general service the Springfield is the best arm.				
	Sharps	16	do	Should be sighted more accurately				
	Ward-Burton	21	do	Too complicated for cavalry service				
Dec	Remington, at half-cock	6	do	Does not extract the shells properly	1,083	1 per ct.	Springfield	See special report.
	Remington, at full-cock	6	do	do				
	Springfield	12	do	For general service the Springfield is the best arm.				
	Sharps	16	do	Should be sighted more accurately				
	Ward-Burton	21	do	Too complicated for cavalry service				
1873.								
Jan	Remington, at half-cock	6	do	Does not extract the shells properly	640	1 per ct.	Springfield	See special report.
	Remington, at full-cock	6	do	do				
	Springfield	12	do					
	Sharps	16	do	Should be sighted more accurately				
	Ward-Burton	21	do	Too complicated for mounted service				

Feb....	Remington, at half-cock.	6	.....do	Does not extract the shells properly.....	48	.....	Springfield....	
	Remington, at full-cock..	6	.....do	.....do				
	Springfield.....	12	.....do	.....	48	.....		
	Sharps.....	29	.....do	Should be sighted more accurately.....	116	.....		
	Ward-Burton	20	.....do	Too complicated for mounted service ...	84	10		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, at half-cock.....	20	2 barrels burst, 5 hammers, 3 mainsprings, 2 firing-pin screws, 3 trigger-springs, 5 firing-pins, 4 firing-pin springs, 2 lever-springs.	48	.....
Remington, at full-cock.....	8	1 firing-pin, 1 firing-pin spring, 2 lever-springs, 1 butt-stock, 1 rear-sight.....		
Springfield.....	27	2 barrels, 3 mainsprings, 3 cam-latch springs, 1 scar-spring, 5 tumbler-screws, 1 firing-pin, 1 firing-pin spring, 2 firing-pin screws, 3 ejector-springs, 3 stocks, 1 lock, 3 tumblers.	48	.....
Sharps.....	27	3 stocks, 3 mainsprings, 8 tumbler-screws, 1 tumbler, 2 firing-pins, 2 lever-springs, 1 lock.....	116	.....
Ward-Burton	21	None reported	84	10

Special report made by Captain E. R. Wells, Second Cavalry, September, 1872.—I have the honor to report that I have used the experimental arms a long time, and find that the Sharps' carbine fouls in the breech by use, and, after being fired a number of times, the lever-bar does not work smoothly; also, the extractor does not extract the shells properly.

The Remington, also, does not extract the shells properly. The extractor only draws the shell a short distance, when they have to be taken out with the fingers. Sometimes they expand, and cannot be withdrawn without considerable difficulty.

The Ward-Burton fails often to explode the cartridge, which is caused by the firing-pin spring becoming weak. The extractor is good, but as the piece is always cocked, and there are so many motions which consume time in working the gun, it is not, in my opinion, adapted for the cavalry service.

The Springfield has a good extractor. The firing-pin does not become weak, and it is no more liable to get out of order than either of the other guns. It is well made, and is, in my opinion, the best carbine in use for cavalry service.

Company I, Second Cavalry, Captain Henry E. Noyes commanding.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. Sept ...	Sharps.....	71	None reported	No remarks.....	630	33	.....	

Company C, Third Cavalry, Lieutenant W. W. Robinson commanding.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.	Sharps	78	1 stock	No remarks	2,000			

Company D, Third Cavalry, Captain Guy V. Henry commanding; Remington, Springfield, and Sharps carbines issued May 13, 1872; Ward-Burton carbines issued May 28, 1872.

1872.								
June	Sharps	63	None reported	No remarks	360		Sharps	
	Ward-Burton	7	do	do	200			
July	Remington, at full-cock	7	do	do	40		Springfield	
	Springfield	7	do	do	40			
	Sharps	70	do	do	380			
	Ward-Burton	7	do	do	40			
Aug	Remington, at full-cock	7	do	do	80	9	Springfield	
	Springfield	7	do	do	80	11		
	Sharps	69	do	do	510	4		
	Ward-Burton	7	do	do	80	23		
Sept	Remington, at full-cock	7	do	do	105	6	Springfield	
	Springfield	7	do	do	105	8		
	Sharps	40	do	do	585	2		
	Ward-Burton	7	do	do	105	14		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, at full-cock	7	None reported	225	15
Springfield	7	do	225	19
Sharps	63	do	1,835	6
Ward-Burton	7	do	425	37

Company E, Third Cavalry, Captain Alex. Sutorius commanding.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.	Sharps	89	None reported	Front sight to be re-adjusted	657	40		

Company F, Third Cavalry, Captain Alex. Moore commanding; Remington, Springfield, and Sharps carbines issued May 13, 1872; Ward-Burton carbines issued May 28, 1872.

1872.								
June	Remington, at half-cock	5	None reported	No remarks	100		Sharps or Springfield	
	Remington, at full-cock	2	do	do				
	Springfield	7	do	do	100			
	Sharps	52	do	do	300			
	Ward-Burton	7	do	do	100			
July	Remington, at half-cock	5	1 hammer	do	100		Sharps or Springfield	
	Remington, at full-cock	2	None reported	do				
	Springfield	7	do	do	100			
	Sharps	49	do	do	300			
	Ward-Burton	7	do	do	100			
Aug	Remington, at half-cock	5	do	do	100		Sharps or Springfield	
	Remington, at full-cock	2	do	do				
	Springfield	7	do	do	100			
	Sharps	49	do	do	300			
	Ward-Burton	7	do	do	100			
Sept	Remington, at half-cock	5	do	do	100	10	Sharps or Springfield	
	Remington, at full-cock	2	do	do				
	Springfield	7	do	do	100	5		
	Sharps	48	do	do	300	10		
	Ward-Burton	7	do	do	100	12		
Oct	Remington, at half-cock	5	do	do	100	10	Sharps	
	Remington, at full-cock	2	do	do				
	Springfield	7	do	do	100	5		
	Sharps	48	do	Should be more accurately sighted, and front sight of harder material.	300	10		
	Ward-Burton	7	do	No remarks	100	12		
Nov	Remington, at half-cock	5	do	do	100	10	Springfield	Lieut. A. De B. Smead commanding.
	Remington, at full-cock	2	do	do				
	Springfield	7	do	do	100	5		
	Sharps	54	do	do	300	20		
	Ward-Burton	7	do	do	100	9		

Company F, Third Cavalry, Captain Alex. Moore commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. Dec	Remington, at half-cock	5	None reported	No remarks	130	20	Springfield	Lieut. A. De B. Smead commanding.
	Remington, at full-cock	2	do	do				
	Springfield	7	do	do	150	5		
	Sharps	63	do	do	320	18		
	Ward-Burton	7	do	do	150	9		
1873. Jan	Remington, at half-cock	5	do	do	140	25	Springfield	Lieut. A. De B. Smead commanding.
	Remington, at full-cock	2	do	do				
	Springfield	7	do	do	150	5		
	Sharps	63	do	do	330	20		
	Ward-Burton	7	do	do	160	11		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, at half-cock	5	2 hammers	870	75
Remington, at full-cock	2	None reported		
Springfield	7	do	900	25
Sharps	52	do	2,450	78
Ward-Burton	7	do	910	53

Company L, Third Cavalry, Captain Thomas L. Brent commanding.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. Sept	Sharps	73	None reported	Sight too coarse; front sight too low; smaller charge of powder.	560	20	Sharps	

Company M, Third Cavalry, Captain Anson Mills commanding.

1872.	Sharps	92	None reported	No remarks	900	6	Remington, at half-cock.	

Company F, Fourth Cavalry, Captain Wirt Davis commanding.

1873. Feb.	Sharps	80	None reported	No remarks	550	23	Springfield	

Company H, Fourth Cavalry, Captain S. Gunther commanding.

1873. Feb.	Sharps	73	None reported	No remarks	520	50	Springfield	

Company K, Fourth Cavalry, Captain E. M. Heyl commanding; Remington, Springfield, and Sharps carbines, issued August 5, 1871; Ward-Burton issued June 4, 1872.

1871.								
Sept.	Remington, at full-cock	28	None reported	To load at half-cock			Springfield	
	Springfield	28	do	No remarks				
	Sharps	28	do	do				
Oct.	Remington, at full-cock	27	2 barrels burst	do	1,000	13	Springfield	
	Springfield	28	4 stocks	The ejector to be made 1-16 inch longer	1,000	10		
	Sharps	28	None reported	No remarks	1,000	12		
Nov.	Remington, at half-cock	27	do	do	300	4	Springfield	
	Springfield	28	do	The ejector to be made 1-16 inch longer	300	2		
	Sharps	28	do	Very difficult to load while mounted; hammer in the way.	300	5		
Dec.	Remington, at half-cock	22	do	No remarks			Springfield	
	Springfield	27	do	The ejector to be made 1-16 inch longer				
	Sharps	26	do	Very difficult to load while mounted; hammer in the way.				
1872.								
Jan.	Remington, at half-cock	22	do	No remarks			Springfield	
	Springfield	27	do	The ejector to be made 1-16 inch longer				
	Sharps	26	do	Very difficult to load while mounted; hammer in the way.				

Company K, Fourth Cavalry, Captain E. M. Heyl commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
Feb.	Remington, at half-cock	22	None reported	No remarks			Springfield	
	Springfield	27	do	The ejector to be made 1-16 inch longer				
	Sharps	26	do	Very difficult to load while mounted; hammer in the way.				
March	Remington, at half-cock	20	do	To have an ejector	150	9	Springfield	
	Springfield	27	do	The ejector to be made 1-16 inch longer	170	7		
	Sharps	26	do	Very difficult to load while mounted; hammer in the way.	140	12		
April	Remington, at half-cock	27	do	To have an ejector	200	40	Springfield	
	Springfield	20	do	The ejector to be made 1-16 inch longer	200	32		
	Sharps	26	do	Very difficult to load while mounted; hammer in the way.	200	41		
May	Remington, at half-cock	20	do	To have an ejector	245	20	Springfield	
	Springfield	27	do	The ejector to be made 1-16 inch longer	245	14		
	Sharps	26	do	Very difficult to load while mounted; hammer in the way.	245	36		
June	Remington, at half-cock	27	do	To have an ejector			Springfield	
	Springfield	20	5 stocks, 5 rear-sights, 1 breech-block.	The ejector to be made 1-16 inch longer				
	Sharps	26	None reported	Very difficult to load while mounted; hammer in the way.				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, at full-cock	28	2 barrels	1,895	86
Springfield	28	9 stocks, 5 rear-sights, 1 breech-block	1,915	65
Sharps	28	None reported	1,885	106

Company A, Fifth Cavalry, Lieutenant A. B. Woodson commanding.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
Oct	Remington, at half-cock	6	None reported	No remarks	105	4	Springfield	
	Remington, at full-cock	1	do	To load at half-cock				
	Springfield	11	do	No remarks	231	1		
	Sharps	57	do	do	1,104	19		
Nov	Remington, at half-cock	7	do	do	42	1	Springfield	
	Remington, at full-cock	1	1 lock	To load at half-cock				
	Springfield	11	None reported	No remarks	90	2		
	Sharps	57	do	do	210	11		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, at half-cock	6	None reported	147	5
Remington, at full-cock	1	1 lock		
Springfield	11	None reported	321	3
Sharps	57	do	1,314	50

Company K, Fifth Cavalry, Captain J. W. Mason commanding.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
Sept	Sharps	76	9 sear-springs, 2 stocks		6,150	250	Springfield	

Company [illegible], Sixth Cavalry, Captain John A. Irwin commanding; Remington, Springfield, and Sharps carbines issued October 1, 1871; Ward-Burton carbines issued June 25, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. Sept	Remington, at half-cock	11	1 barrel burst	No remarks	120	10	Springfield	
	Remington, at full cock	9	1 trigger-spring	do				
	Springfield	22	1 barrel burst, 1 barrel-spring	do	120	5		
	Sharps	20	2 lever-springs	do	120	5		
	Ward-Burton	18	2 guard-screws	do	120	5		

Company G, Sixth Cavalry, Captain T. C. Tupper commanding.

1872. Sept	Sharps	56	None reported	No remarks	820	164	Remington, at half-cock.	

Company H, Sixth Cavalry, Captain Sheldon Sturgeon commanding.

1872. Sept	Sharps	81	1 stock, 4 tumbler-screws	No remarks	3,000	223	Sharps	

Company L, Sixth Cavalry, Captain C. B. McClellan commanding; Ward-Burton carbines issued June 8, 1872.

1872. Sept	Ward-Burton	18	None reported	Unfit for cavalry service	400	100	Springfield	
Nov	do	18	do	No remarks			do	

Company F, Seventh Cavalry, Captain George W. Tate commanding; Remington, Springfield, and Sharps carbines issued June 13, 1871; Ward-Burton carbines issued April 16, 1872.

1872.								
Aug ...	Remington, at full-cock	21	None reported	To load at half-cock	125	6		
	Springfield	21	do	No remarks	125	7		See special report.*
	Sharps	21	do	do	125	6		
	Ward-Burton	21	do	do	125	6		

* *Copy of a special report made by Lieutenant Larned, Seventh Cavalry, May 31, 1872.*— * * * * * * * Whenever the arms were in the hands of the men, it was noticed that the piece seemingly requiring the least attention in manipulation of loading was the Government Springfield carbine. A proper allowance, however, should be made in that respect in favor of the Ward-Burton and Remington, both of which, and particularly the former, are less familiar to them than the Springfield.

For rapidity of fire there appears to be little choice between the Ward-Burton and the Springfield, both of which excel in that respect the Remington, as their facilities for ejecting cartridges are superior to those of the latter. This superiority appears to arise from the fact, first, of their greater leverage, by which a tight cartridge is withdrawn without difficulty, the same also affecting its insertion; second, that in the latter piece the thumb, in drawing back the breech-block, is generally in the way of the falling cartridge. * * * * * * * The mechanism of the former, although somewhat cumbrous, appears to be sufficiently strong, and to perform all its functions with the greatest efficiency. I should suggest the somewhat unnecessary size of the lever-knob, and the unsatisfactory substitute for a half-cock.

As regards the Remington, I should suggest the necessity of some arrangement by which the piece could be loaded at a half-cock; also a more powerful and efficient ejecting-mechanism. * * * * * * *

Company K, Seventh Cavalry, Captain Owen Hale commanding; Remington, Springfield, and Sharps carbines issued June 15, 1871; Ward-Burton carbines issued April 16, 1872.

1871.								
Aug ...	Remington, at full-cock	28	None reported	No remarks	50	3		
	Springfield	28	do	do	50	1		
	Sharps	28	do	do	50	2		

Company D, Ninth Cavalry, Captain F. S. Dodge commanding.

1872.								
Aug ...	Sharps	80	2 sears	No remarks	200			
Sept ...	do	80	1 stock	More effective ejector	250	3		

Company D, Ninth Cavalry, Captain F. S. Dodge commanding—Continued.

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Sharps	80	2 sears, 1 stock	450	3

Company L, Ninth Cavalry, Captain E. S. Meyer commanding; Remington, Springfield, and Sharps carbines issued August 5, 1871; Ward-Burton carbines issued June 4, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Oct	Remington, at half-cock	20	None reported	No remarks	25			
	Remington, at full cock	7	1 rear-sight leaf, 1 front-sight	Rear-sight spring should be stronger				
	Springfield	27	None reported	Rear-sight spring should be stronger	25			
	Sharps	27	do	No remarks	25			
Nov	Remington, at half-cock	19	2 rear-sight leaves, 2 stocks	Rear-sight spring should be stronger and front sight.	170	6		
	Remington, at full cock	8	None reported	Rear-sight spring should be stronger				
	Springfield	27	1 stock	No remarks	170			
	Sharps	27	None reported	do	170	2		
Dec	Remington, at half-cock	19	do	Modify hammer or breech-block, so that more forcible blow be given firing-pin.	145	3		
	Remington, at full cock	8	do	No remarks				
	Springfield	27	2 rear-sight leaves	do	145	1		
	Sharps	27	None reported	do	145	2		
1872.								
Jan	Remington, at half-cock	19	do	Modify hammer or breech-block, so that more forcible blow be given firing-pin.	80	2	Springfield	
	Remington, at full-cock	8	do	No remarks				
	Springfield	27	do	do	80			
	Sharps	27	do	do	80	1		
Feb	Remington, at half-cock	19	do	Modify hammer or breech-block, so that more forcible blow be given firing-pin.	46	1		
	Remington, at full-cock	8	do	No remarks				
	Springfield	27	do	do	47			
	Sharps	27	do	do	47	1		

March	Remington, at half-cock	19	None reported	Modify hammer or breech-block so that more forcible blow be given firing-pin.	50		Springfield	
	Remington, at full-cock	8	do	No remarks				
	Springfield	27	do	do	50			
	Sharps	27	do	do	50			
April	Remington, at half-cock	19	do	Modify hammer or breech-block so that more forcible blow be given firing-pin.	10		Springfield	
	Remington, at full-cock	8	do	No remarks				
	Springfield	27	1 rear-sight leaf	do	10			
	Sharps	27	None reported	do	10			
July	Remington, at half-cock	16	1 stock, 1 rear-sight	Modify hammer or breech-block so that more forcible blow be given firing-pin.	335		Springfield	
	Remington, at full-cock	4	1 stock	No remarks				
	Springfield	20	2 stocks, 2 rear-sights	Rear-sight leaf to be made so as to lie either way.	360			
	Sharps	20	1 stock, 4 mainsprings	No remarks	340			
Aug	Remington, at half-cock	16	None reported	Modify hammer or breech-block so that more forcible blow be given firing-pin.	180	1	Springfield	Lieut. E. D. Dimmick commanding.
	Remington, at full-cock	4	do	No remarks				
	Springfield	20	1 barrel burst	do	180			
	Sharps	20	None reported	do	180	1		
	Ward-Burton	19	do	Mechanism such as to render it unsuitable for mounted service.	180			
Sept	Remington, at half-cock	16	do	Modify hammer or breech-block so that more forcible blow be given firing-pin.	160	2	Springfield	Lieut. E. D. Dimmick commanding.
	Remington, at full-cock	4	do	No remarks				
	Springfield	20	do	do	160	3		
	Sharps	20	do	do	160	4		
	Ward-Burton	19	do	Mechanism such as to render it unsuitable for mounted service.	160			
Oct	Remington, at half-cock	16	do	Modify hammer or breech-block so that more forcible blow be given firing-pin.				
	Remington, at full-cock	4	do	No remarks				
	Springfield	20	do	do				
	Sharps	20	do	do				
	Ward-Burton	20	do	Mechanism such as to render it unsuitable for mounted service.				
Nov	Remington, at half-cock	4	do	Modify hammer or breech-block so that more forcible blow be given firing-pin; butt-stocks to be made stronger.	110	7	Springfield	
	Remington, at full-cock	16	1 extractor					
	Springfield	19	1 rear-sight slide	No remarks	110	2		
	Sharps	19	1 rear-sight	do	110	10		
	Ward-Burton	20	None reported	Mechanism such as to render it unsuitable for mounted service.	110	2		
Dec	Remington, at half-cock	4	do	Modify hammer or breech-block so that more forcible blow be given firing-pin; butt-stocks to be made stronger.	120	2	Springfield	
	Remington, at full-cock	16	do					
	Springfield	19	do	No remarks	120	1		
	Sharps	19	do	do	120			
	Ward-Burton	20	1 locking-bolt spring	Mechanism such as to render it unsuitable for mounted service.	120			

Company L, Ninth Cavalry, Captain Francis Moore commanding—Continued.

Date of report.	Kind of arms.	On hand.	Kind of arms.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1873.								
Jan....	Remington, at half-cock	4	None reported	Butt-stocks should be made stronger; sliding-sights should be made to fall forward.	152	25	Springfield...	Captain Francis Moore commanding.
	Remington, at full-cock	16	do					
	Springfield	19	do	Same remarks apply to Springfield	125	8		
	Sharps	19	do	No remarks	150	23		
	Ward-Burton	20	do	do	163	32		
Feb....	Remington, at half-cock	4	do	Butt-stocks should be made stronger; sliding-sights should be made to fall forward.	150	7	Springfield...	Captain Francis Moore commanding.
	Remington, at full-cock	12	do					
	Springfield	14	do	The same remarks apply to Springfield	150	4		
	Sharps	17	do	No remarks	150	9		
	Ward-Burton	20	1 barrel burst	do	150	3		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, at half-cock	20	3 stocks, 1 rear-sight, 2 sight-leaves	1,633	56
Remington, at full-cock	7	1 stock, 1 extractor, 1 rear-sight leaf, 1 front-sight		
Springfield	27	1 rear-sight slide, 1 barrel, 3 stocks, 5 rear-sight leaves	1,732	19
Sharps	27	1 stock, 4 mainsprings, 1 rear-sight	1,737	53
Ward-Burton	20	1 locking-bolt spring, 1 barrel	885	37

2.—ABSTRACTS OF THE MONTHLY REPORTS RECEIVED FROM THE ARTILLERY.

Company D, Second Artillery, Captain E. R. Platt commanding; Remington, Springfield, and Sharps rifle-muskets issued June 2, 1871; Ward-Burton rifle-muskets issued June 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
July	Remington, model 1870	20	1 barrel swelled	No remarks	495	10	Springfield	Lieut. R. E. De Russy commanding.
	Springfield, model 1870	20	None reported	do	495	6		
	Sharps, model 1870	20	do	do	495	23		
Aug.	Remington, model 1870	20	do	do			Springfield	Lieut. R. E. De Russy commanding.
Sept.	Springfield, model 1870	20	do	do				
Oct.								
Nov.	Sharps, model 1870	20	do	do				
Dec.	Remington, model 1870	20	do	do	166	11	Springfield	Lieut. R. E. De Russy commanding.
	Springfield, model 1870	20	do	do	166	19		
	Sharps, model 1870	20	do	do	166	6		
1872.								
Jan.	Remington, model 1870	19	do	do			Springfield	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	do				
Feb.	Remington, model 1870	19	do	do			Not given	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 barrel	661	21
Springfield, model 1870	20	None reported	661	25
Sharps, model 1870	20	do	661	29

Company F, Second Artillery, Captain Edward B. Williston commanding; Remington, Springfield, and Sharps rifle-muskets issued June 2, 1871; Ward-Burton rifle-muskets issued June 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
June	Remington, model 1870	19	None reported	No remarks			Remington, if modified to load at half-cock.	
	Springfield, model 1870	19	do	do				
	Sharps, model 1870	19	do	do				
July, Aug., Sept., Oct.	Remington, model 1870	19	do	do			Remington, if modified to load at half-cock.	
	Springfield, model 1870	19	do	do				
	Sharps, model 1870	20	do	do				
Dec.	Remington, model 1870	19	do	do			Springfield*	*Remington, if modified to load at half-cock.
	Springfield, model 1870	19	do	do				
	Sharps, model 1870	20	do	do				
Special report.	Remington, model 1870	20	1 barrel burst	do	800 ball 1600 bl'k		Springfield	
	Springfield, model 1870	19	None reported	do				
	Sharps, model 1870	20	1 barrel burst	do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	19	1 barrel		
Springfield, model 1870	19	None reported		
Sharps, model 1870	19	1 barrel		

Company G, Second Artillery, Captain Carle A. Woodruff commanding; Remington, Springfield, and Sharps rifle-muskets issued June 2, 1871; Ward-Burton rifle-muskets issued June 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. Aug ...	Remington, model 1870..	19	None reported	Should load at half-cock	30	2	Springfield...	
	Springfield, model 1870..	20	do		40			
	Sharps, model 1870	20	do		30			

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	19	None reported	30	2
Springfield, model 1870	20	do	40	
Sharps, model 1870	20	do	30	

Company H, Second Artillery, Captain George T. Olmsted commanding; Remington, Springfield, and Sharps rifle-muskets issued June 2, 1871; Ward-Burton rifle-muskets issued June 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. July ...	Remington, model 1870..	20	None reported	To load at half-cock	70		Remington...	
	Springfield, model 1870..	20	do	No remarks	60			
	Sharps, model 1870	19	do	do	70	1		
Aug ...	Remington, model 1870..	20	do	do	40	2	Remington...	
	Springfield, model 1870..	20	do	do	64	1		
	Sharps, model 1870	19	do	do	48			
Sept ...	Remington, model 1870.	20	do	do	56		Remington ..	
	Springfield, model 1870..	20	do	do	56			
	Sharps, model 1870	19	do	do	64			

Company H, Second Artillery, Captain George T. Olmsted commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. March	Remington, model 1870	20	None reported	No remarks	82	4	Springfield	
	Springfield, model 1870	20	do	do	91	2		
	Sharps, model 1870	19	1 barrel burst	do	31			

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	None reported	248	6
Springfield, model 1870	20	do	271	3
Sharps, model 1870	19	1 barrel burst	213	1

Company M, Second Artillery, Captain A. C. M. Pennington commanding; Remington, Springfield, and Sharps rifle-muskets issued December 16, 1871; *Ward-Burton rifle-muskets issued June* 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. Jan	Remington, model 1870	19	None reported	No remarks				
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	do				
Feb	Remington, model 1870	10	do	To load at half-cock; lower swivel too small; ramrod too short.				
	Springfield, model 1870	11	do	No remarks				
	Sharps, model 1870	10	1 lever	Gun-sling in the way; ramrod too short				

Mar...	Remington, model 1870..	12	None reported	Difference between half-cock and full-cock too slight.			Springfield...	
	Springfield, model 1870..	11	do	No remarks				
	Sharps, model 1870	12	1 lever, 1 firing-pin	Gun-sling in the way; ramrod too short				
April..	Remington, model 1870..	12	None reported	Clumsy to throw up for inspection; comb of hammer too short.			Springfield...	
	Springfield, model 1870..	10	do	No remarks				
	Sharps, model 1870	12	do	Too unwieldy				
May...	Remington, model 1870..	12	do	Clumsy to throw up for inspection; comb of hammer too short.			Springfield...	
	Springfield, model 1870..	12	do	No remarks				
	Sharps, model 1870	12	1 lever	Too unwieldy				
June...	Remington, model 1870..	19	1 rear-sight	Clumsy to throw up for inspection; comb of hammer too short.	336	(*)		*9 failed in Ward-Burton which exploded in other arms.
	Springfield, model 1870..	20	None reported	No remarks				
	Sharps, model 1870	20	2 firing-pins	Too unwieldy				
	Ward-Burton, mod. 1870.	20	None reported	No remarks				
July...	Remington, model 1870..	19	1 barrel swelled	Clumsy to throw up for inspection; comb of hammer too short.	133	3		
	Springfield, model 1870..	20	None reported	No remarks	106	3		
	Ward-Burton, mod. 1870	20	1 trigger-stop screw	No remarks	113	6		
Aug...	Remington, model 1870..	19	None reported	Clumsy to throw up for inspection; comb of hammer too short.	143	102		
	Springfield, model 1870 .	20	1 rear-sight leaf	No remarks	119			
	Ward-Burton, mod. 1870	20	None reported	No remarks	118			
Sept...	Remington, model 1870..	19	do	Clumsy to throw up for inspection; comb of hammer too short.	215	108		
	Springfield, model 1870..	20	1 rear-sight leaf	No remarks				
	Ward-Burton, mod. 1870.	20	1 firing-pin guide	No remarks				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	19	1 barrel, 1 rear-sight	276	3
Springfield, model 1870	20	2 rear-sight leaves	225	
Sharps, model 1870	20	2 levers, 3 firing-pins		
Ward-Burton, model 1870	20	1 trigger-stop screw, 1 firing-pin guide		

Company E, Third Artillery, Captain A. C. Wildrick commanding.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. Sept ...	Springfield, model 1870..	40	None reported	No remarks	177	13	Springfield...	
	Sharps, model 1870	19	do	do	123	2		

Company H, Third Artillery, Captain D. R. Ransom commanding; Remington, Springfield, and Sharps rifle-muskets issued June 21, 1872; *Ward-Burton rifle-muskets issued March* 19, 1872.

1872. July ...	Remington, model 1870..	19	2 mainsprings	To load at half-cock; more powerful ejector.	159	4		
	Springfield, model 1870..	19	None reported	Musket, bayonet, and ramrod to be numbered.	165	1		
	Ward-Burton, mod. 1870.	19	2 stocks	Stock made stronger; too complicated	183	6		
Aug ...	Remington, model 1870..	19	None reported	To load at half-cock; more powerful ejector.	174	2	Springfield...	
	Springfield, model 1870..	19	do	Musket, bayonet, and ramrod to be numbered.	198	1		
	Ward-Burton, mod. 1870.	19	do	Stock made stronger; too complicated	195	8		
Sept ...	Remington, model 1870..	19	do	To load at half-cock; more powerful ejector.	145	7	Springfield...	Lieut. Chas. Humphrey commanding.
	Springfield, model 1870..	19	do	Musket, bayonet, and ramrod to be numbered.	175	4		
	Ward-Burton, mod. 1870.	19	1 locking-bolt screw	Stock made stronger; too complicated	160	6		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	19	2 mainsprings	478	13
Springfield, model 1870	19	None reported	538	6
Ward-Burton, model 1870	19	2 stocks, 1 locking-bolt screw	538	20

Company K, Third Artillery, Captain L. L. Livingston commanding; Remington, Springfield, and Sharps rifle-muskets issued April 29, 1871; Ward-Burton rifle-muskets, March 19, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
May	Remington, model 1870	19	None reported	No remarks	130	3		
	Springfield, model 1870	19	do	do	100	3		
	Sharps, model 1870	19	1 tumbler	do	75	3		
June	Remington, model 1870	19	None reported	do	189			
	Springfield, model 1870	19	do	do	160	8		
	Sharps, model 1870	19	do	do	210			
July	Remington, model 1870	19	do	do	112			
	Springfield, model 1870	19	do	do	90		Springfield	Lieut. C. M. Callahan commanding.
	Sharps, model 1870	19	do	do	111			
Aug	Remington, model 1870	19	do	do	75			
	Springfield, model 1870	19	do	do	80		Springfield	Lieut. C. M. Callahan commanding.
	Sharps, model 1870	19	do	do	78			
Sept. Oct. Nov.	Remington, model 1870	19	do	do				
	Springfield, model 1870	19	do	do				
	Sharps, model 1870	19	do	do				
Dec	Remington, model 1870	19	do	do	75			
	Springfield, model 1870	19	do	do	60			
	Sharps, model 1870	19	do	do	57			
1872.								
Jan	Remington, model 1870	19	do	do	420			
	Springfield, model 1870	19	do	do	450			
	Sharps, model 1870	19	1 firing-pin	do	398			
Feb	Remington, model 1870	19	None reported	do	207			
	Springfield, model 1870	19	do	do	261			
	Sharps, model 1870	19	do	do	300			

Company K, Third Artillery, Captain L. L. Livingston commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
Mar ...	Remington, model 1870..	19	None reported	Barrel shortened 4 to 6 inches; to load at half-cock; lengthen thumb-piece of breech-block and hammer.	300		Springfield...	
	Springfield, model 1870..	19	do	No remarks	280			
	Sharps, model 1870	19	1 tumbler, 1 firing-pin	do	190			
Apr ...	Remington, model 1870..	19	None reported	do	510	2	Springfield ..	Lieut. William Arthur, commanding.
	Springfield, model 1870..	19	do	do	440	2		
	Ward-Burton, model 1870	19	do	do	540	2		
May ...	Remington, model 1870..	19	1 extractor	do	485	3		Several failed in Ward-Burton, which were fired in other arms.
	Springfield, model 1870..	19	None reported	do	360	3		
	Ward-Burton, model 1870	19	do	do	595	3		
June...	Remington, model 1870..	19	do	do				
	Springfield, model 1870..	19	do	do				
	Ward-Burton, model 1870	19	do	Mainspring too weak				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	19	1 Extractor	2,503	8
Springfield, model 1870	19	None reported	2,281	16
Sharps, model 1870	19	2 tumblers, 2 firing-pins	1,419	3
Ward-Burton, model 1870	19	None reported	1,135	5

Company G, Fourth Artillery, Captain John Mendenhall commanding; Remington, Springfield, and Sharps rifle-muskets issued December 1, 1872; *Ward-Burton rifle-muskets issued December* 1, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1873.								
Feb....	Remington, model 1870..	19	None reported	No remarks				
	Springfield, model 1870..	14	do	do				
	Ward-Burton, model 1870	18	do	do				

Company K, Fourth Artillery, Lieutenant George M. Harris commanding.

1873. Feb....	Remington, model 1870..	20	None reported	No remarks	50			
	Springfield, model 1870..	40	.....do	.....do	60			
	Ward-Burton, model 1870 *	20	.....do	.....do	50	4		

Company E, Fifth Artillery, Captain D. H. Kinzie commanding.

	Springfield	70	None reported	No remarks				

3.—ABSTRACTS OF THE MONTHLY REPORTS RECEIVED FROM THE INFANTRY.

Company C, Third Infantry, Captain J. A. Snyder commanding; Remington, Springfield, and Sharps rifle-muskets issued May 20, 1871; Ward-Burton rifle-muskets issued March 25, 1872.

1871. June...	Remington, model 1870..	20	1 firing-pin	An ejector-spring would be an improvement.	500		Remington...	
	Springfield, model 1870..	20	None reported	No remarks	500	1		*1 was fired in Remington.
	Sharps, model 1870	20	1 firing-pin	Gun-sling in the way; should be removed.	500	2*		
July...	Remington, model 1870..	20	None reported	An ejector-spring would be an improvement.	500		Remington...	
	Springfield, model 1870..	19	.....do	No remarks	500			
	Sharps, model 1870	17	.....do	Gun-sling in the way; should be removed.	500			
Aug...	Remington, model 1870..	20	.....do	An ejector-spring would be an improvement.	500	3	Remington...	
	Springfield, model 1870..	19	1 stock broken by being run over; 1 barrel bent, and stock torn by mad wolf.	No remarks	500	2		
	Sharps, model 1870	16	.....do	Gun-sling in the way; should be removed.	500	5		
Sept...	Remington, model 1870..	20	.....do	An ejector-spring would be an improvement.	500		Remington...	
	Springfield, model 1870..	18	.....do	No remarks	500			
	Sharps, model 1870	16	.....do	Gun-sling in the way; should be removed.	500	2		
Oct....	Remington, model 1870..	20	.....do	An ejector-spring would be an improvement.	550	1	Remington...	
	Springfield, model 1870..	18	.....do	No remarks	550	3		
	Sharps, model 1870	16	.....do	Gun-sling in the way; should be removed.	400	1		
Nov...	Remington, model 1870..	20	.....do	An ejector-spring would be an improvement.	550		Remington...	
	Springfield, model 1880..	18	.....do	No remarks	450			
	Sharps, model 1870	16	.....do	Gun-sling in the way; should be removed.	500	1		
Dec....	Remington, model 1870..	20	1 main-spring	An ejector-spring would be an improvement.	450		Remington...	
	Springfield, model 1870..	18	None reported	No remarks	400			
	Sharps, model 1870	16	.....do	Gun-sling in the way; should be removed.	550			

Company C, Third Infantry, Captain J. A. Snyder commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872								
Jan	Remington, model 1870	20	1 extractor	An ejector-spring would be an improvement.	550		Remington	
	Springfield, model 1870	16	None reported	No remarks	500			
	Sharps, model 1870	14	1 receiver, 1 barrel and swivel, 1 butt-stock, 1 tang-screw, 1 ramrod, 1 complete, lost in action.	Gun-sling in the way; should be removed.	550	1		
Feb	Remington, model 1870	20	None reported	An ejector-spring would be an improvement.	550	1	Remington	
	Springfield, model 1870	16	do	No remarks	400	1		
	Sharps, model 1870	14	do	Gun-sling in the way; should be removed.	700	2		
Mar	Remington, model 1870	19	do	An ejector-spring would be an improvement.	550	3	Remington	
	Springfield, model 1870	16	do	No remarks	340	2		
	Sharps, model 1870	14	do	Gun-sling in the way; should be removed.	550	7		
April	Remington, model 1870	19	do	An ejector-spring would be an improvement.	350	3	Remington	
	Springfield, model 1870	15	1 extractor lost from neglect	No remarks	300	7		
	Sharps, model 1870	14	None reported	Gun-sling in the way; should be removed.	300	11		
	Ward-Burton, model 1870	20	do	No remarks	550	5		
May	Remington, model 1870	19	do	An ejector-spring would be an improvement.	200	2		
	Springfield, model 1870	15	do	No remarks	179	3		
	Sharps, model 1870	14	do	Gun-sling in the way; should be removed.	400	11		
	Ward-Burton, model 1870	20	do	To be made lighter on trigger	500	4		
June	Remington, model 1870	19	1 firing-spring	An ejector-spring would be an improvement.	300		Remington	
	Springfield, model 1870	15	None reported	No remarks	300			
	Sharps, model 1870	14	do	Gun-sling in the way; should be removed.	350			
	Ward-Burton, model 1870	19	Lost or stolen, 1 musket complete	Too hard on trigger; a dangerous arm in hands of green troops.	350			
July	Remington, model 1870	18	1 stolen	An ejector-spring would be an improvement.	300	1		
	Springfield, model 1870	15	None reported	No remarks	300	1		Prefers Springfield or Remington for uniform use.
	Sharps, model 1870	14	do	Gun-sling in the way; should be removed.	300	2		
	Ward-Burton, model 1870	18	1 lost	Too hard on trigger; a dangerous arm in hands of green troops.	600			
Aug	Remington, model 1870	18	None reported	An ejector-spring would be an improv'mt.	400			
	Springfield, model 1870	14	do	No remarks	400			
	Sharps, model 1870	14	do	Gun-sling in the way; should be removed.	400	2		
	Ward-Burton, model 1870	18	do	Too hard on trigger; a dangerous arm in hands of green troops.	750			

Sept...	Remington, model 1870..	18	.....do	An ejector-spring would be an improvement.	400	1	
	Springfield, model 1870..	13	.....do	No remarks	300	2	
	Sharps, model 1870	14	1 ramrod lost	Gun-sling in the way; should be removed	100		
	Ward-Burton, model 1870	17	1 upper-guard screw	Too hard on trigger; should have automatic locking-bolt; a dangerous arm in hands of green troops.	630		
Oct....	Remington, model 1870..	18	None reported	An ejector-spring would be an improvement.	400	2	
	Springfield, model 1870..	13	.....do	No remarks	355		
	Sharps, model 1870	14	.....do	Gun-sling in the way; should be removed	300	2	
	Ward-Burton, model 1870	16	1 stolen	Too hard on trigger; should have automatic locking-bolt; a dangerous arm in hands of green troops.	650	1	
Nov...	Remington, model 1870..	18	None reported	An ejector-spring would be an improvement.	350	1	
	Springfield, model 1870..	13	.....do	No remarks	200	1	
	Sharps, model 1870	14	.....do	Gun-sling in the way; should be removed	350		
	Ward-Burton, model 1870	16	.....do	Too hard on trigger; should have automatic locking-bolt; a dangerous arm in hands of green troops.	600		
Dec....	Remington, model 1870..	18	.....do	An ejector-spring would be an improvement.	250	1	
	Springfield, model 1870..	13	.....do	No remarks	200		
	Sharps, model 1870	14	.....do	Gun-sling in the way; should be removed	200	1	
	Ward-Burton, model 1870	16	.....do	Too hard on trigger; should have automatic locking-bolt; a dangerous arm in hands of green troops.	790		
1873.							
Jan....	Remington, model 1870..	18	.....do	Should have an ejector-spring	200		
	Springfield, model 1870..	13	.....do	No remarks	200	1	
	Sharps, model 1870	14	.....do	.....do	200		
	Ward-Burton, model 1870	16	.....do	Too hard on trigger; should have automatic locking-bolt.	400		
Feb....	Remington, model 1870..	18	.....do	Should have an ejector-spring	100		
	Springfield, model 1870..	14	.....do	No remarks	150	1	
	Sharps, model 1870	14	.....do	.....do	150		
	Ward-Burton, model 1870	16	.....do	Too hard on trigger; should have automatic locking-bolt.	300	2	

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 firing-pin, 1 firing-pin spring, 1 mainspring, 1 extractor	8,450	19
Springfield, model 1870	20	No remarks	7,524	25
Sharps, model 1870	20	1 firing-pin	8,300	50
Ward-Burton, model 1870	20	1 upper-guard screw	6,120	12

Company G, Third Infantry, Captain J. Ford Kent commanding; Remington, Springfield, and Sharps rifle-muskets issued May 20, 1871; Ward-Burton rifle-muskets issued March 25, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. June...	Remington, model 1870..	16	None reported	Does not eject shells; should load at half-cock.	666	.....	Springfield...	
	Springfield, model 1870..	11	.....do	No remarks	666	.....		
	Sharps, model 1870	15	.....do	A trigger-guard; does not eject; clogs; gun-sling in the way; dangerous arm.	666	.....		
July...	Remington, model 1870..	19	.....do	Does not eject shells; should load at half-cock.	100	10	Springfield...	
	Springfield, model 1870..	19	.....do	No remarks				
	Sharps, model 1870	19	.....do	A trigger-guard; does not eject; clogs; gun-sling in the way; dangerous arm.				
Aug...	Remington, model 1870..	18	.....do	Does not eject shells; should load at half-cock.	600	100	Springfield...	
	Springfield, model 1870..	18	.....do	No remarks				
	Sharps, model 1870	18	.....do	A trigger-guard; does not eject; clogs; gun-sling in the way; dangerous arm.				
Sept...	Remington, model 1870..	18	.....do	Does not eject shells; should load at half-cock.	900	60	Springfield...	
	Springfield, model 1870..	43	.....do	No remarks				
	Sharps, model 1870	18	.....do	A trigger-guard; does not eject; clogs; gun-sling in the way; dangerous arm.				
Oct....	Remington, model 1870..	16	.....do	Does not eject shells; should load at half-cock.	680	.....	Springfield...	
	Springfield, model 1870..	43	.....do	No remarks	1,320	.....		
Nov...	Remington, model 1870..	16	1 rear-sight	Does not eject shells; should load at half-cock.	100	.....	Springfield...	
	Springfield, model 1870..	43	None reported	No remarks	250	.....		
Dec....	Remington, model 1870..	16	1 rear-sight	Does not eject shells; should load at half-cock.	50	.....	Springfield...	
	Springfield, model 1870..	43	None reported	No remarks	300	.....		
1872. Jan....	Remington, model 1870..	16	1 rear-sight	Does not eject shells; should load at half-cock.	100	.....	Springfield...	
	Springfield, model 1870..	74	None reported	No remarks	250	.....		
March.	Remington, model 1870..	16	1 rear-sight	Does not eject shells; should load at half-cock.	400	.....	Springfield...	
	Springfield, model 1870..	74	None reported	No remarks	800	.....		
June...	Remington, model 1870..	16	.....do	Does not eject shells; should load at half-cock.	330	.....	Springfield...	
	Springfield, model 1870..	51	1 ejector-spring	No remarks				

Company H, Third Infantry, Captain Louis T. Morris commanding; Remington, Springfield, and Sharps rifle-muskets issued May 20, 1871; Ward-Burton rifle-muskets issued March 25, 1872.

1871.								
July.	Remington, model 1870	20	None reported	To load at half-cock; means to extract shells.			Springfield	
Aug.	Springfield, model 1870	20	do	No remarks.				
	Sharps, model 1870	20	do	do				
Sept	Remington, model 1870	20	do	To load at half-cock; means to extract shells.	923	5	Springfield	
	Springfield, model 1870	20	do	No remarks	923			
	Sharps, model 1870	20	Lever and front-sight	do	923			
Oct	Remington, model 1870	20	None reported	To load at half-cock; means to extract shells.			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	do				
Nov	Remington, model 1870	19	do	To load at half-cock; means to extract shells.			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	do				
Dec	Remington, model 1870	16	do	To load at half-cock; means to extract shells.	400	14	Springfield	
	Springfield, model 1870	19	do	No remarks	400			
	Sharps, model 1870	20	do	do	400	15		
1872.								
Jan	Remington, model 1870	16	do	To load at half-cock; means to extract shells.	300	4	Springfield	Lieutenant Thomas S. Wallace commanding.
	Springfield, model 1870	19	do	No remarks	100			
	Sharps, model 1870	20	1 lever	do	120			
Feb	Remington, model 1870	16	None reported	To load at half-cock; means to extract shells.	210		Springfield	Lieutenant Thomas S. Wallace commanding.
	Springfield, model 1870	19	do	No remarks	340			
	Sharps, model 1870	20	do	do	260			
Mar	Remington, model 1870	16	do	To load at half-cock; means to extract shells.	160		Springfield	
	Springfield, model 1870	18	do	No remarks	160			
	Sharps, model 1870	20	do	do	160			
Apr	Remington, model 1870	16	do	To load at half-cock; means to extract shells.	140		Springfield	
	Springfield, model 1870	13	do	No remarks	50			
	Sharps, model 1870	1	Ramrod lost; rear-sight broken	do	40			
	Ward-Burton, model 1870	20	None reported	do				
May	Remington, model 1870	16	1 mainspring	To load at half-cock; means to extract shells.				
	Springfield, model 1870	18	None reported	Springfield is the best arm, less complicated and less liable to get out of order.	180	None	Springfield	
	Sharps, model 1870	1	do	No remarks				
	Ward-Burton, model 1870	20	do	do				

Company H, Third Infantry, Captain Louis T. Morris commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
July	Remington, model 1870	14	None reported	To load at half-cock; means to extract shells.	890	1	Springfield	
	Springfield, model 1870	19	do	The best arm; less complicated and less liable to get out of order.				
	Ward-Burton, model 1870	20	do	No remarks				
Aug	Remington, model 1870	13	do	To load at half-cock; means to extract shells.	810	18	Springfield	
	Springfield, model 1870	17	1 mainspring	The best arm; less complicated and less liable to get out of order.				
	Ward-Burton, model 1870	20	1 locking-bolt, 2 upper guard-screws.	No remarks				
Sept	Remington, model 1870	14	None reported	To load at half-cock; means to extract shells.	860	4	Springfield	
	Springfield, model 1870	17	do	The best arm; less complicated and less liable to get out of order.				
	Ward-Burton, model 1870	20	do	No remarks				
Oct	Remington, model 1870	12	do	To load at half-cock; means to extract shells.	620	7	Springfield	
	Springfield, model 1870	17	do	The best arm; less complicated and less liable to get out of order.				
	Ward-Burton, model 1870	18	do	No remarks				
Nov	Remington, model 1870	11	1 mainspring	To load at half-cock; means to extract shells.	180		Springfield	
	Springfield, model 1870	16	None reported	The best arm; less complicated and less liable to get out of order.	140			
	Ward-Burton, model 1870	19	2 locking-bolts	No remarks	220	1		
Dec	Remington, model 1870	12	None reported	To load at half-cock; means to extract shells.	170		Springfield	
	Springfield, model 1870	18	do	The best arm; less complicated and less liable to get out of order.	230			
	Sharps, model 1870	1	do	No remarks				
	Ward-Burton, model 1870	20	2 locking-bolts in target practice.	do	260	3		
1873.								
Jan	Remington, model 1870	12	None reported	do	120	1	Springfield	
	Springfield, model 1870	16	do	do	80			
	Sharps, model 1870	1	do	do				
	Ward-Burton, model 1870	19	1 breech-bolt dislocated	do	90			
Feb	Remington, model 1870	12	None reported	To load at half-cock	270	2	Springfield	
	Springfield, model 1870	17	do	No remarks	380			
	Sharps, model 1870	1	do	do				
	Ward-Burton, model 1870	19	3 front guard-screws	3 front guard-screws	520	1		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	2 mainsprings	2,873	26
Springfield, model 1870	20	1 mainspring	2,803	.....
Sharps, model 1870	20	2 levers, 1 front-sight, 1 rear-sight	1,903	15
Ward-Burton, model 1870	20	5 locking-bolts, 5 upper guard-screws	1,090	5

Company K, Third Infantry, Captain Dangerfield Parker commanding.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1873. March	Springfield, model 1870	50	None reported	No remarks	.....	.....	.....	

Company C, Fourth Infantry, Captain E. M. Coates commanding; Remington, Springfield, and Sharps rifle-muskets issued April 29, 1871; Ward-Burton rifle-muskets issued March 19, 1872.

1871. June	Remington, model 1870	20	None reported	No remarks	.....	.....	.....	Arms not yet in hands of the men.
	Springfield, model 1870	20	do	do	.....	.....	.....	
	Sharps, model 1870	20	do	do	.....	.....	.....	
July	Remington, model 1870	20	do	To be arranged for sling, and to load at half-cock.	.....	.....	.....	Not tested.
	Springfield, model 1870	20	do	No remarks	.....	.....		
	Sharps, model 1870	20	do	To be arranged for sling	.....	.....		
Aug	Remington, model 1870	20	do	To be arranged for sling, and to load at half-cock.	.....	.....	Remington	Prefers Remington, if altered as above.
	Springfield, model 1870	20	do	No remarks	.....	.....		
	Sharps, model 1870	20	do	To be arranged for sling	.....	.....		
Sept	Remington, model 1870	20	do	To be arranged for sling, and to load at half-cock.	200	1	Remington	
	Springfield, model 1870	20	do	No remarks	.....	.....		
	Sharps, model 1870	20	do	To be arranged for sling	.....	.....		

Company C, Fourth Infantry, Captain E. M. Coates commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Oct	Remington, model 1870	20	None reported	To be arranged for sling, and to load at half-cock.			Remington	Lieut. John W. Bubb commanding.
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	To be arranged for sling				
Nov	Remington, model 1870	20	do	To be arranged for sling, and to load at half-cock.	250	4	Remington	Lieut. John W. Bubb commanding.
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	To be arranged for sling				
Dec	Remington, model 1870	20	do	No remarks			Remington	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	do				
1872.								
Jan	Remington, model 1870	20	do	To load at half-cock			Remington	Lieut. John W. Bubb commanding.
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	1 tumbler	To be arranged for sling				
Feb	Remington, model 1870	20	None reported	To load at half-cock			Remington	Lieut. John W. Bubb commanding.
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	To be arranged for sling				
March	Remington, model 1870	20	do	No remarks				No place to test arms.
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	do				
April	Remington, model 1870	20	do	do				No opportunity to test arms.
	Springfield, model 1870	20	do	do				
	Ward-Burton, mod. 1870	20	do	do				
May	Remington, model 1870	20	do	do				As above.
	Springfield, model 1870	20	do	do				
	Ward-Burton, mod. 1870	20	do	do				
June	Remington, model 1870	20	do	do				As above.
	Springfield, model 1870	20	4 firing-pin springs	do				
	Ward-Burton, mod. 1870	20	None reported	do				
July	Remington, model 1870	20	do	Should load at half-cock			Remington	Lieut. H. E. Robinson commanding.
	Springfield, model 1870	20	do	No remarks				
	Ward-Burton, mod. 1870	20	do	do				
Aug	Remington, model 1870	20	do	Should load at half-cock			Remington	
	Springfield, model 1870	20	5 firing-pin springs	No remarks				
	Ward-Burton, mod. 1870	20	None reported	do				
Oct	Remington, model 1870	20	do	Should load at half-cock			Remington	
	Springfield, model 1870	20	do	No remarks				
	Ward-Burton, mod. 1870	20	do	do				
1873.								
Jan	Remington, model 1870	20	do	Should load at half-cock				

	Springfield, model 1870	20	do	No remarks			
	Ward-Burton, mod. 1870	20	do	do			
Feb.	Remington, model 1870	20	do	Should load at half-cock			
	Springfield, model 1870	20	do	No remarks			
	Ward-Burton, mod. 1870	20	do	do			

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	None reported	200	
Springfield, model 1870	20	9 firing-pin springs		
Sharps, model 1870	20	1 tumbler		
Ward-Burton, model 1870	20	None reported		

Company B, Fifth Infantry, Captain A. S. Bennett commanding; Remington, Springfield, and Sharps rifle-muskets issued May 16, 1871; *Ward-Burton rifle-muskets issued March* 25, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Nov.	Remington, model 1870	18	None reported	To load at half-cock, and more force given to ejector.	210	1	Springfield	
	Springfield, model 1870	19	do	No remarks	276	3		
	Sharps, model 1870	19	1 lever-catch, 1 breech-block, 1 lever.	More force given to ejector	210	7		
Dec.	Remington, model 1870	18	None reported	To load at half-cock, and more force given to ejector.	180	2	Springfield	
	Springfield, model 1870	19	do	No remarks	180	1		
	Sharps, model 1870	19	1 rear-sight	Two fail to eject shell on throwing open the breech-block.	180	12		2 fired in Springfield.

Company B, Fifth Infantry, Captain A. S. Bennett commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
Jan	Remington, model 1870	17	None reported	No remarks	150	3	Springfield	
	Springfield, model 1870	19	Barrel enlarged near muzzle	do	210	1		
	Sharps, model 1870	19	None reported	do	90	1		
Feb	Remington, model 1870	17	1 breech-block catches	Don't allow ejector to throw out the shell	180	3	Springfield	
	Springfield, model 1870	19	None reported	No remarks	240	3		
	Sharps, model 1870	19	1 tumbler, 1 bridle	do	180			
March	Remington, model 1870	17	None reported	do	180		Springfield	
	Springfield, model 1870	19	do	do	220	4		
	Sharps, model 1870	19	do	do	200			
April	Remington, model 1870	17	Breech-block fails to allow shell to clear the barrel; forced out with ramrod.	do	60		Springfield	
	Springfield, model 1870	16	None reported	do	60			
	Sharps, model 1870	4	do	do				
	Ward-Burton, mod. 1870	20	do	do	70			
May	Remington, model 1870	17	1 rear-sight	do	90	1	Springfield	
	Springfield, model 1870	16	None reported	do	110			
	Ward-Burton, mod. 1870	20	do	do	90	1		
June	Remington, model 1870	16	do	do	80		Springfield	
	Springfield, model 1870	14	do	do	100			
	Ward-Burton, mod. 1870	20	do	do	130	1		
July	Remington, model 1870	16	do	do	40	1	Springfield	
	Springfield, model 1870	14	do	do	50	1		
	Ward-Burton, mod. 1870	20	do	do	50			
Aug	Remington, model 1870	16	do	do	60	1	Springfield	
	Springfield, model 1870	14	do	do	60			
	Ward-Burton, mod. 1870	20	do	do	80			
Sept	Remington, model 1870	20	do	do	100	6	Springfield	
	Springfield, model 1870	17	1 ejector	do	100	1		
	Ward-Burton, mod. 1870	20	1 firing-pin	do	100	8		
Oct	Remington, model 1870	20	None reported	do	30		Springfield	
	Springfield, model 1870	17	do	do	30			
	Ward-Burton, mod. 1870	20	do	do	30			
Nov	Remington, model 1870	20	do	do	50		Springfield	
	Springfield, model 1870	17	do	do	50			
	Ward-Burton, mod. 1870	20	do	do	50	1		
1873.								
Feb	Remington, model 1870	20	do	do	40		Springfield	
	Springfield, model 1870	18	do	do	40			
	Ward-Burton, mod. 1870	20	do	do	40			

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 rear-sight	1,240	16
Springfield, model 1870	20	1 barrel, 1 ejector	1,726	14
Sharps, model 1870	20	1 lever-catch, 1 lever, 1 breech-block, 1 rear-sight, 1 bridle, 1 tumbler	860	20
Ward-Burton, model 1870	20	1 firing-pin	640	11

Company F, Fifth Infantry, Captain Simon Snyder commanding: Remington, Springfield, and Sharps rifle-muskets issued May 16, 1871; *Ward-Burton rifle-muskets issued March* 25, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
July	Remington, model 1870	20	None reported	No remarks			Springfield	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	do				
Aug	Remington, model 1870	20	do	do			Springfield	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	do				
Sept	Remington, model 1870	20	do	do			Springfield	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	do				
Oct	Remington, model 1870	18	1 stock	do			Springfield	
	Springfield, model 1870	20	None reported	do				
	Sharps, model 1870	20	1 barrel burst	do				
Nov	Remington, model 1870	18	None reported	do			Springfield	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	1 barrel burst and 1 stock broken	do				
Dec	Remington, model 1870	18	None reported	do			Springfield	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	do				
1872.								
Jan	Remington, model 1870	18	do	do			Springfield	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	do				
March	Remington, model 1870	18	do	do			Springfield	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	do				

Company F, Fifth Infantry, Captain Simon Snyder commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
April	Remington, model 1870	17	None reported	No remarks			Springfield	
	Springfield, model 1870	20	do	do				
	Ward-Burton, model 1870	20	do	do				
May	Remington, model 1870	17	do	do			Springfield	
	Springfield, model 1870	20	2 firing-pins	do				
	Ward-Burton, model 1870	20	1 stock-screw	do				
June	Remington, model 1870	17	None reported	do			Springfield	
	Springfield, model 1870	20	do	do				
	Ward-Burton, model 1870	20	do	do				
July	Remington, model 1870	17	1 lock, accidentally	do			Springfield	
	Springfield, model 1870	20	2 firing-pins, 2 firing-pin springs, 2 ejector-springs.	do				
	Ward-Burton, model 1870	20	None reported	do				
Aug	Remington, model 1870	17	1 stock	do			Springfield	
	Springfield, model 1870	20	None reported	do				
	Ward Burton, model 1870	20	do	do				
Sept	Remington, model 1870	17	1 stock, 1 firing-pin	do			Springfield	
	Springfield, model 1870	20	2 firing-pins, 2 firing-pin springs, 2 band-swivel screws.	do				
	Ward-Burton, model 1870	20	None reported	do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	2 stocks, 1 lock, 1 firing-pin		
Springfield, model 1870	20	6 firing-pins, 4 firing-pin springs, 2 ejector-springs, 2 band-swivel screws		
Sharps, model 1870	20	2 barrels, 1 stock, 1 stock-screw		
Ward-Burton, model 1870	20	None reported		

Company G, Fifth Infantry, Captain Samuel Overshine commanding; Remington, Springfield, and Sharps rifle-muskets issued May 23, 1871; Ward-Burton rifle-muskets issued March 16, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. June	Remington, model 1870	18	None reported	To load at half-cock; guard-swivel in the way; ramrod too short.			Springfield	
	Springfield, model 1870	18	do	No remarks				
	Sharps, model 1870	18	do	Guard-swivel in the way; ramrod too short; cartridge-shells stick.				
July	Remington, model 1870	18	do	To load at half-cock; guard-swivel in the way; ramrod too short.	278		Springfield	All the arms too hard on trigger.
	Springfield, model 1870	18	do	No remarks	225			
	Sharps, model 1870	18	do	Guard-swivel in the way; ramrod too short; cartridge-shells stick.	310	2		
Aug	Remington, model 1870	18	do	To load at half-cock; guard-swivel in the way; ramrod too short.	360		Springfield	
	Springfield, model 1870	18	do	No remarks	240			
	Sharps, model 1870	18	do	Guard-swivel in the way; ramrod too short; cartridge-shells stick.	180	2		
Sept	Remington, model 1870	18	do	To load at half-cock; guard-swivel in the way; ramrod too short.	200		Springfield	
	Springfield, model 1870	18	do	No remarks	100			
	Sharps, model 1870	18	do	Guard-swivel in the way; ramrod too short; cartridge-shells stick.	100			
Oct	Remington, model 1870	18	do	To load at half-cock; guard-swivel in the way; ramrod too short.	180		Springfield	
	Springfield, model 1870	18	do	No remarks	100			
	Sharps, model 1870	18	do	Guard-swivel in the way; ramrod too short; cartridge-shells stick.	100			
Nov. Dec.	Remington, model 1870	18	do	To load at half-cock; guard-swivel in the way; ramrod too short.			Springfield	
	Springfield, model 1870	18	do	No remarks				
	Sharps, model 1870	18	do	Guard-swivel in the way; ramrod too short; cartridge-shells stick.				
1872. Jan	Remington, model 1870	18	1 tang-screw	To load at half-cock; guard-swivel in the way; ramrod too short.	49		Springfield	
	Springfield, model 1870	18	None reported	No remarks	50			
	Sharps, model 1870	18	do	Guard-swivel in the way; ramrod too short; cartridge-shells stick.	54	1		
Feb	Remington, model 1870	18	do	To load at half-cock; guard-swivel in the way; ramrod too short.			Springfield	
	Springfield, model 1870	18	do	No remarks				
	Sharps, model 1870	18	do	Guard-swivel in the way; ramrod too short; cartridge-shells stick.				

Company G, Fifth Infantry, Captain Samuel Overshine commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
Mar..	Remington, model 1870..	18	None reported	To load at half-cock; guard-swivel in the way; ramrod too short.			Springfield...	
April	Springfield, model 1870..	18	do	No remarks				
May .	Ward-Burton, model 1870	18	do	Too complicated; liable to premature discharge.				
June...	Remington, model 1870..	17	1 ejector	To load at half-cock; guard-swivel in the way; ramrod too short.	51		Springfield...	
	Springfield, model 1870..	18	None reported	No remarks	72			
	Ward-Burton, model 1870	18	do	Self-cocking arrangement objectionable..	54			
July...	Remington, model 1870..	16	do	To load at half-cock; guard-swivel in the way; ramrod too short.	54		Springfield...	
	Springfield, model 1870..	18	do	No remarks	80			
	Ward-Burton, model 1870	18	do	Too complicated; liable to premature discharge.	54			
Aug...	Remington, model 1870..	16	do	To load at half-cock; guard-swivel in the way; ramrod too short.	112		Springfield...	Rear-sight slides become loose from wear.
	Springfield, model 1870..	18	do	No remarks	132			
	Ward-Burton, model 1870	18	1 breech-bolt cracked	Self-cocking arrangement objectionable..	48			
Sept...	Remington, model 1870..	16	None reported	To load at half-cock; guard-swivel in the way; ramrod too short.	52		.....	
	Springfield, model 1870..	18	do	No remarks	48			
	Ward-Burton, model 1870	18	do	Self-cocking arrangement objectionable..	96			
Oct....	Remington, model 1870..	16	do	To load at half-cock; guard-swivel in the way; ramrod too short.			Springfield...	
	Springfield, model 1870..	18	do	No remarks				
	Ward-Burton, model 1870	18	do	Self-cocking arrangement objectionable..				
Nov...	Remington, model 1870..	16	do	To load at half-cock; guard-swivel in the way; ramrod too short.	32		Springfield...	
	Springfield, model 1870..	18	do	No remarks	28			
	Ward-Burton, model 1870	18	1 mainspring	Self-cocking arrangement objectionable..	28			
Dec....	Remington, model 1870..	16	1 firing-pin	To load at half-cock; guard-swivel in the way; ramrod too short.	25		Springfield...	
	Springfield, model 1870..	18	None reported	No remarks	40			
	Ward-Burton, model 1870	18	do	Self-cocking arrangement objectionable..	20			
1873.								
Jan....	Remington, model 1870..	16	do	No remarks			Springfield...	
	Springfield, model 1870..	18	do	do				
	Ward-Burton, model 1870	17	do	do				
Feb....	Remington, model 1870..	16	do	do			Springfield...	
	Springfield, model 1870..	18	do	do				
	Ward-Burton, model 1870	17	do	do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	18	1 firing-pin, 1 tang-screw, 1 ejector	1,213	.....
Springfield, model 1870	18	None reported	1,115	.....
Sharps, model 1870	18	do	744	5
Ward-Burton, model 1870	18	1 breech-bolt, 1 mainspring	300	.....

Company H, Fifth Infantry, Lieutenant T. H. Logan commanding; Remington, Springfield, and Sharps rifle-muskets issued May 16, 1871; *Ward-Burton rifle-muskets issued March* 16, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
June	Remington, model 1870	18	1 firing-pin	No remarks	18	1	.....	
	Springfield, model 1870	18	1 firing-pin, 1 tumbler-screw	do	12	.....	.....	
	Sharps, model 1870	18	2 levers, 1 lever-spring	do	6	.....	.....	
July	Remington, model 1870	18	None reported	do	72	1	.....	
	Springfield, model 1870	18	1 br'ch-bl'k cap-screw, 1 searspring	do	78	2	.....	
	Sharps, model 1870	18	None reported	do	50	1	.....	
Aug	Remington, model 1870	17	do	do	189	2	.....	
	Springfield, model 1870	18	1 tumbler-screw, 1 firing-pin screw	do	275	4	.....	
	Sharps, model 1870	18	None reported	Lever is made of too hard metal	266	3	.....	
Sept	Remington, model 1870	17	do	No remarks	179	1	Springfield	
	Springfield, model 1870	18	1 tumbler-screw, 1 firing-pin spri'g	do	158	3		
	Sharps, model 1870	18	None reported	Lever is made of too hard metal	208	2		
Oct	Remington, model 1870	17	do	No remarks	50	.....	Springfield	
	Springfield, model 1870	18	do	do	46	.....		
	Sharps, model 1870	18	do	Lever is made of too hard metal	54	.....		
Nov	Remington, model 1870	17	do	No remarks	56	.....	Springfield	
	Springfield, model 1870	18	do	do	62	1		
	Sharps, model 1870	18	do	Lever is made of too hard metal	32	1		
Dec	Remington, model 1870	17	do	No remarks	170	1	Springfield	Recommends the barrels of all arms be made heavier.
	Springfield, model 1870	17	do	do	155	2		
	Sharps, model 1870	18	do	Gun-sling swivel to be moved forward	170	1		
1872.								
Jan	Remington, model 1870	17	do	No remarks	145	1	Springfield	
	Springfield, model 1870	17	do	do	180	1		
	Sharps, model 1870	18	do	Gun-sling swivel to be moved forward	155	1		

Company H, Fifth Infantry, Lieutenant T. H. Logan commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
Feb	Remington, model 1870	17	None reported	No remarks	130	1	Springfield	
	Springfield, model 1870	17	do	do	200	2		
	Sharps, model 1870	18	do	Gun-sling swivel to be moved forward	140	1		
March	Remington, model 1870	17	do	No remarks	130	2	Springfield	
	Springfield, model 1870	17	do	do	260	1		
	Sharps, model 1870	2	2 tips of levers	Gun-sling swivel to be moved forward	115			
	Ward-Burton, model 1870	18	None reported	No remarks				
April	Remington, model 1870	17	do	do	200		Springfield	
	Springfield, model 1870	17	do	do	230	2		
	Sharps, model 1870	2	do	Gun-sling swivel to be moved forward				
	Ward-Burton, model 1870	18	do	A dangerous weapon on account of liability of premature discharge.	70			
May	Remington, model 1870	17	do	No remarks	150		Springfield	
	Springfield, model 1870	17	do	do	150			
	Sharps, model 1870	2	do	Gun-sling swivel to be moved forward				
	Ward-Burton, model 1870	18	do	A dangerous weapon on account of liability of premature discharge.	150	1		
June	Remington, model 1870	16	do	No remarks	110	2	Springfield	
	Springfield, model 1870	17	do	do	220	3		
	Sharps, model 1870		do	Gun-sling swivel to be moved forward				
	Ward-Burton, model 1870	18	None reported	A dangerous weapon on account of liability of premature discharge.	110	1		
July	Remington, model 1870	16	Bore torn and screws lost	No remarks	130	2	Springfield	
	Springfield, model 1870	17	None reported	do	230	3		
	Sharps, model 1870		do	Gun-sling swivel to be moved forward				
	Ward-Burton, model 1870	18	1 breech-bolt	A good arm in the hands of careful men.	160	2		
Aug	Remington, model 1870	15	1 rear-sight	No remarks	130	1	Springfield	
	Springfield, model 1870	17	None reported	do	230	3		
	Sharps, model 1870		do	Gun-sling swivel to be moved forward				
	Ward-Burton, model 1870	17	1 rear-sight	A good arm in the hands of careful men.	160	3		
Sept	Remington, model 1870	15	None reported	No remarks	160	2	Springfield	
	Springfield, model 1870	17	do	do	230	3		
	Sharps, model 1870		do	Gun-sling swivel to be moved forward				
	Ward-Burton, model 1870	17	None reported	A good arm in the hands of careful men.	200	3		
Oct	Remington, model 1870	15	do	No remarks	140	1	Springfield	
	Springfield, model 1870	17	do	do	180	3		
	Sharps, model 1870	15	do	Gun-sling swivel to be moved forward				
	Ward-Burton, model 1870	17	do	A good arm in the hands of careful men.	140	2		
Nov	Remington, model 1870	15	do	No remarks	170	1	Springfield	
	Springfield, model 1870	15	do	do	190			
	Sharps, model 1870	5	do	Gun-sling swivel to be moved forward				
	Ward-Burton, model 1870	17	do	A good arm in the hands of careful men.	130			

Dec.	Remington, model 1870	15	do	No remarks	39		Springfield
	Springfield, model 1870	20	3 firing-pins	do	100	1	
	Sharps, model 1870		None reported	Gun-sling swivel to be moved forward			
	Ward-Burton, model 1870	17	do	A good arm in the hands of careful men	50		
1873.							
Jan. Feb.	Remington, model 1870	14	do	No remarks			Springfield
	Springfield, model 1870	20	do	do			
	Ward-Burton, model 1870	17	do	do			

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	18	1 firing-pin, 1 rear-sight	2,368	19
Springfield, model 1870	18	1 firing-pin screw, 1 firing-pin spring, 3 tumbler-screws, 4 firing-pins, 1 breech-block cap-screw, 1 sear spring.	3,186	34
Sharps, model 1870	18	2 levers, 1 lever-spring	1,206	10
Ward-Burton, model 1870	18	1 breech-bolt, 1 rear-sight	1,170	12

Company I, Fifth Infantry, Captain W. Lyman commanding; Remington locking-rifles issued December 21, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
	Remington, locking-rifles	60	None reported	No remarks				

Company K, Fifth Infantry, Captain D. H. Brotherton commanding; Remington, Springfield, and Sharps rifle-muskets issued May 16, 1871; *Ward-Burton rifle-muskets issued March* 16, 1872.

1871.							
May	Remington, model 1870	20	None reported	No remarks	24	2	Springfield
	Springfield, model 1870	20	do	do	27		
	Sharps, model 1870	20	do	do	39	4	
June	Remington, model 1870	20	do	do	57	4	Springfield
	Springfield, model 1870	20	do	do	75		
	Sharps, model 1870	20	do	do	72	4	
Aug.	Remington, model 1870	20	do	do	60		Springfield
	Springfield, model 1870	20	do	do	74		
	Sharps, model 1870	20	do	do	96		

Company K, Fifth Infantry, Captain D. H. Brotherton commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Sept	Remington, model 1870	20	None reported	No remarks	68		Springfield	
	Springfield, model 1870	20	do	do	93			
	Sharps, model 1870	20	do	do	95			
Oct	Remington, model 1870	20	do	do	18		Springfield	
	Springfield, model 1870	20	do	do	33			
	Sharps, model 1870	20	do	do	24			
Nov	Remington, model 1870	20	do	Rear-sight slides unserviceable			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	Rear-sight slides unserviceable				
Dec	Remington, model 1870	20	do	Rear-sight slides unserviceable; to load at half-cock.	20		Springfield	Lieut. Mason Carter commanding.
	Springfield, model 1870	19	do	No remarks	18			
	Sharps, model 1870	20	do	Rear-sight slides unserviceable	20	1		
1872.								
Jan	Remington, model 1870	20	do	Rear-sight slides unserviceable; to load at half-cock.	27		Springfield	Lieut. Mason Carter commanding.
	Springfield, model 1870	19	do	No remarks	27			
	Sharps, model 1870	20	do	Rear-sight slides unserviceable	30			
Feb	Remington, model 1870	20	do	Rear-sight slides unserviceable; to load at half-cock.			Springfield	Lieut. Mason Carter, commanding.
	Springfield, model 1870	19	do	No remarks				
	Sharps, model 1870	20	do	Rear-sight slides unserviceable				
March	Remington, model 1870	20	do	Rear-sight slides unserviceable; to load at half-cock.	100		Springfield	Lieut. Mason Carter commanding.
	Springfield, model 1870	19	do	No remarks	100			
	Sharps, model 1870	1	Rear-sight and lever-catch lost	Rear-sight slides unserviceable	100			
	Ward-Burton, model 1870	20	None reported	No remarks				
April	Remington, model 1870	20	do	Rear-sight slides unserviceable; to load at half-cock.			Springfield	Lieut. Mason Carter commanding.
	Springfield, model 1870	19	do	No remarks				
	Sharps, model 1870		do	Rear-sight slides unserviceable				
	Ward-Burton, model 1870	20	do	No remarks				
May	Remington, model 1870	20	do	do			Springfield	
	Springfield, model 1870	19	do	do				
	Ward-Burton, model 1870	20	do	do				
June	Remington, model 1870	20	do	do	120	1	Springfield	
	Springfield, model 1870	19	do	do	180	1		
	Ward-Burton, model 1870	20	do	do	100	1		
Sept	Remington, model 1870	20	do	To load at half-cock	81		Springfield	Lieut. Mason Carter commanding.
	Springfield, model 1870	19	do	No remarks	102			
	Ward-Burton, model 1870	20	do	do	117			

Nov ...	Remington, model 1870..	20	.....do	To load at half-cock			Springfield...	Lieut. Mason Carter, commanding.
	Springfield, model 1870..	19	.....do	No remarks				
	Ward-Burton, model 1870	20	.....do	.....do				
1873.								
Jan	Remington, model 1870..	10	.....do	.....do			Springfield...	
	Springfield, model 1870..	28	.....do	.....do				
	Ward-Burton, model 1870	20	.....do	.....do				
Feb ...	Remington, model 1870..	10	1 rear-sight	.....do			Springfield...	
	Springfield, model 1870..	28	None reported	.....do				
	Ward-Burton, model 1870	20	.....do	.....do				
March .	Remington, model 1870..	10	.....do	.....do			Springfield...	
	Springfield, model 1870..	28	.....do	.....do				
	Ward-Burton, model 1870	20	.....do	.....do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20		576	7
Springfield, model 1870	20		729	1
Sharps, model 1870	20		476	9
Ward-Burton, model 1870	20		217	1

Company B, Sixth Infantry, Captain Orlando H. Moore commanding; Remington, Springfield, and Sharps rifle-muskets issued May 18, 1871.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
July ...	Remington, model 1870..	18	None reported	To load at half-cock				
	Springfield, model 1870..	18	.....do	No remarks				
	Sharps, model 1870	18	.....do	.....do				
Aug ...	Remington, model 1870..	18	.....do	To load at half-cock	36			
	Springfield, model 1870	18	.....do	No remarks	36			
	Sharps, model 1870	18	1 rear-sight	.....do	36			
Sept ...	Remington, model 1870..	18	None reported	To load at half-cock	70			
	Springfield, model 1870..	18	.....do	No remarks	60			
	Sharps, model 1870	18	.....do	.....do	70			
Oct	Remington, model 1870..	18	1 rear-sight	To load at half-cock				
	Springfield, model 1870..	17	1 musket complete, lost	No remarks				
	Sharps, model 1870	18	1 stock	.....do				
Nov ...	Remington, model 1870..	18	None reported	To load at half-cock	50			
	Springfield, model 1870..	17	.....do	No remarks	50			
	Sharps, model 1870	20	1 stock, 1 rear-sight	.....do	50			

Company B, Sixth Infantry, Captain Orlando H. Moore commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Dec	Remington, model 1870	20	None reported	To load at half-cock	150			
	Springfield, model 1870	19	do	No remarks	150			
	Sharps, model 1870	20	1 stock, 1 rear-sight	do	150			
1872.								
Jan	Remington, model 1870	20	None reported	To load at half-cock	75			
	Springfield, model 1870	19	do	No remarks	75			
	Sharps, model 1870	20	1 stock, 1 rear-sight	do	75			
Feb	Remington, model 1870	19	1 stolen by deserter	To load at half-cock	100			
	Springfield, model 1870	19	None reported	No remarks	100			
	Sharps, model 1870	18	do	do	100			
March	Remington, model 1870	18	1 stolen by deserter	To load at half-cock	50			
	Springfield, model 1870	17	2 stolen by deserter	No remarks	50			
	Sharps, model 1870	18	None reported	do	50			
April	Remington, model 1870	18	do	To load at half-cock	50			
	Springfield, model 1870	17	do	No remarks	50			
	Sharps, model 1870	18	do	do	50			
June	Remington, model 1870	18	do	To load at half-cock				
	Springfield, model 1870	14	do	No remarks				
	Sharps, model 1870	15	do	do				
July	Remington, model 1870	18	do	To load at half-cock	50			
	Springfield, model 1870	14	do	No remarks	50			
	Sharps, model 1870	15	do	do	50			
Aug	Remington, model 1870	16	do	To load at half-cock	50			
	Springfield, model 1870	14	do	No remarks	50			
	Sharps, model 1870	15	1 stock	do	50			
Sept	Remington, model 1870	16	None reported	To load at half-cock				
	Springfield, model 1870	14	do	No remarks				
	Sharps, model 1870	14	1 stock-butt	do				
Oct	Remington, model 1870	16	None reported	To load at half-cock				
	Springfield, model 1870	14	do	No remarks				
	Sharps, model 1870	13	1 tip-stock	do				
Nov	Remington, model 1870	15	1 tip-stock, 1 barrel bent	To load at half-cock				
	Springfield, model 1870	14	None reported	No remarks				
	Sharps, model 1870	13	do	do				
Dec	Remington, model 1870	15	do	As a mechanical proposition the Remington superior.			Remington	
	Springfield, model 1870	14	do	The men are inclined to prefer the Springfield.				
	Sharps, model 1870	13	do	No remarks				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	18	1 rear-sight, 1 tip-stock	681	.....
Springfield, model 1870	18	None reported	669	.....
Sharps, model 1870	18	8 stocks, 4 rear-sights, 1 barrel bent	681	.....

Company F, Sixth Infantry, Captain W. W. Sanders commanding; Remington, Springfield, and Sharps rifle-muskets issued May 18, 1871; Ward-Burton rifle-muskets issued March 25, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
June	Remington, model 1870	18	None reported	No remarks	70	14	.....	
	Springfield, model 1870	18	do	do	60	10	.....	
	Sharps, model 1870	18	do	do	63	9	.....	
July	Remington, model 1870	18	do	Should be modified to load at half-cock	28	3	.....	
	Springfield, model 1870	18	1 rear-sight leaf	No remarks	28	5	.....	
	Sharps, model 1870	18	None reported	do	28	2	.....	
Aug	Remington, model 1870	18	do	Should be modified to load at half-cock	27	3	.....	
	Springfield, model 1870	18	do	No remarks	27	1	.....	
	Sharps, model 1870	18	do	do	27	1	.....	
Nov	Remington, model 1870	17	do	Should be modified to load at half-cock	132	1	Remington	
	Springfield, model 1870	16	do	No remarks	131	18		
	Sharps, model 1870	16	1 lever	do	118	3		
Dec	Remington, model 1870	17	None reported	Should be modified to load at half-cock	30	.....	Remington	Lieutenant R. H. Day commanding.
	Springfield, model 1870	17	do	No remarks	40	.....		
	Sharps, model 1870	16	1 lever-spring	do	30	1		
1872.								
March	Remington, model 1870	14	1 stock, 1 rear-sight leaf, 1 guard-swivel.	Should be modified to load at half-cock	400	7	Remington	Lieutenant R. H. Day commanding.
	Springfield, model 1870	17	1 rear-sight leaf	No remarks	330	5		
	Sharps, model 1870	17	1 lever, 1 tumbler	do	300	11		
May	Remington, model 1870	13	None reported	To load at half-cock; to have ejector-spring in barrel.	.....	.....	Remington, with suggested modifications.	Lieutenant R. H. Day commanding.
	Springfield, model 1870	16	do	No remarks	.....	.....		
	Sharps, model 1870	16	1 tip-stock, 1 band, 1 sear	do	.....	.....		
	Ward-Burton, model 1870	18	None reported	do	.....	.....		

Company F, Sixth Infantry, Captain W. W. Sanders commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. June...	Remington, model 1870 ..	13	None reported	To load at half-cock; to have ejector-spring in barrel.			Remington ..	Lieutenant R. H. Day commanding.
	Springfield, model 1870 ..	16	do	No remarks				
	Sharps, model 1870	16	do	do				
	Ward-Burton, model 870	18	do	do				
Aug...	Remington, model 1870 ..	13	do	To load at half-cock; to have ejector-spring in barrel.	986	18	Remington...	Lieutenant R. H. Day commanding.
	Springfield, model 1870 ..	30	do	No remarks				
	Ward-Burton, model 1870	18	do	do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	18	1 stock, 1 rear-sight leaf, 1 guard-swivel	687	28
Springfield, model 1870	18	2 rear-sight leaves	616	39
Sharps, model 1870	18	1 tip-stock, 1 band, 1 sear, 2 levers, 1 lever-spring, 1 tumbler	566	27
Ward-Burton, model 1870	18			

Company G, Sixth Infantry, Captain H. S. Hawkins commanding; Remington, Springfield, and Sharps rifle-muskets issued May 18, 1871; *Ward-Burton rifle-muskets issued March* 25, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. July...	Remington, model 1870 ..	20	None reported	Should load at half-cock; cartridge-shells stick.	90	5	Springfield...	
	Springfield, model 1870 ..	20	do	No remarks	84	3		
	Sharps, model 1870	20	do	Fails to eject shells	70	2		

Aug...	Remington, model 1870 ..	20	.....do	Should load at half-cock; cartridge-shells stick.	136	5	Springfield...	
	Springfield, model 1870 ..	20	.....do	No remarks.....	138	4		
	Sharps, model 1870	20	.....do	Fails to eject shells	136	.....		
Sept...	Remington, model 1870 ..	20	.....do	Should load at half-cock; cartridge-shells stick.	145	6	Springfield...	
	Springfield, model 1870 ..	20	.....do	No remarks.....	139	5		
	Sharps, model 1870	20	1 tumbler	Fails to eject shells	126	7		
Dec....	Remington, model 1870 ..	20	None reported	Should load at half-cock; cartridge-shells stick.	215	6	Springfield...	
	Springfield, model 1870 ..	20	.....do	No remarks.....	215	3		
	Sharps, model 1870	18	1 lost, 1 stock, 1 tang, 1 escutcheon	Fails to eject shells	215	4		
1872. June...	Remington, model 1870 ..	16	None reported	No remarks.....	256	10	Springfield...	
	Springfield, model 1870 ..	20	.....do	.....do	300	15		
	Ward-Burton, model 1870	20	1 breech-bolt	The shoulder of ejector to be made wider.	265	12		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870.....	20	None reported	841	32
Springfield, model 1870.....	20	.....do.....	876	30
Sharps, model 1870.....	20	1 stock, 1 escutcheon, 1 tumbler, 1 tang.....	547	13
Ward-Burton, model 1870	20	1 breech-bolt.....	265	12

Company A, Eighth Infantry, Captain G. M. Brayton commanding; Remington locking-rifles issued November 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. Nov...	Remington locking-rifles.	58	Broken in transportation.....	Have not been tested	.....	.....	.....	
Dec....	.....do	58	None reported	Most durable and most unlikely to get out of order. The ejection fails in many instances to throw the shell out entirely; this can be remedied by lengthening the thumb-piece of the breech-block.	480	29	.....	
1873. Jan....	.....do	58	.....do	Should have two ejectors, one on each side.	354	18	Remington locking-rifle.	
Feb....	.....do	58	.....do	.....do	366	8	Remington locking-rifle.	

Company A, Eighth Infantry, Captain G. M. Brayton commanding—Continued.

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington locking-rifles			1,200	55

Company I, Eighth Infantry, Captain Alfred Z. Smith commanding; Remington locking-rifles issued November 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. Dec	Remington locking-rifles.	58	None reported	Sometimes fails to eject cartridge-shell	494	40	Remington locking-rifle.	
1873. Jan	do	58	Small of stock broken	Guard-plate should be extended so as to strengthen small of stock.	450	33	Remington locking-rifle.	
Feb	do	58	None reported	do	477	52	Remington locking-rifle.	

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington locking-rifles	58		1,421	125

Company B, Ninth Infantry, Captain J. D. Devin commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871; Ward-Burton rifle-muskets issued March 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. May	Remington, model 1870	20	1 swivel	To load at half-cock; enlarge guard-swivel; comb of hammer too short.	60			

	Springfield, model 1870..	20	None reported	No remarks	60	.....	Springfield...
	Sharps, model 1870	20	.....do	Very awkward arm; sling in the way; lever-catch an impediment in drilling.	60	.....	
June...	Remington, model 1870.	20	1 guard-swivel	To load at half-cock; enlarge guard-swivel; comb of hammer too short.	150	.....	
	Springfield, model 1870..	20	None reported	No remarks	150	.....	Springfield...
	Sharps, model 1870	20	.....do	Very awkward arm; sling in the way; lever-catch an impediment in drilling.	150	.....	
July...	Remington, model 1870..	20	.....do	To load at half-cock; enlarge guard-swivel; comb of hammer too short.	200	.....	
	Springfield, model 1870..	20	.....do	No remarks	200	.....	Springfield...
	Sharps, model 1870	20	.....do	Very awkward arm; sling in the way; lever-catch an impediment in drilling.	200	.....	
Aug...	Remington, model 1870..	18	1 guard-swivel, 2 rear-sights	To load at half-cock; enlarge guard-swivel; comb of hammer too short.	350	12	
	Springfield, model 1870..	19	None reported	No remarks	225	2	Springfield...
	Sharps, model 1870	20	.....do	Very awkward arm; sling in the way; lever-catch an impediment in drilling.	275	6	
Nov...	Remington, model 1870..	17	1 barrel burst	Dust and rust prevent hammer from working freely.	500	15	
	Springfield, model 1870..	17	.....do	No remarks	500	8	Springfield...
	Sharps, model 1870	20	1 stock	Breech-block works stiffly after firing	100	2	
Dec...	Remington, model 1870..	14	None reported	Dust and rust prevent hammer from working freely.	300	3	
	Springfield, model 1870..	15	.....do	No remarks	500	3	Springfield...
	Sharps, model 1870	16	.....do	Breech-block works stiffly after firing	500	6	
1872.							
Jan...	Remington, model 1870..	13	.....do	Dust and rust prevent hammer from working freely.	300	1	
	Springfield, model 1870..	23	.....do	No remarks	200	1	Springfield...
	Sharps, model 1870	16	.....do	Breech-block works stiffly after firing	200	2	
Feb...	Remington, model 1870..	13	.....do	Dust and rust prevent hammer from working freely.	200	3	
	Springfield, model 1870..	23	.....do	No remarks	100	.....	Springfield...
	Sharps, model 1870	16	.....do	Breech-block works stiffly after firing	100	1	
March.	Remington, model 1870..	13	.....do	Dust and rust prevent hammer from working freely.	200	2	
	Springfield, model 1870..	23	.....do	No remarks	200	1	Springfield...
	Ward-Burton, model 1870	20	1 breech-bolt	Too hard on trigger; breech-bolt not strong enough.	800	6	
April..	Remington, model 1870..	11	None reported	Dust and rust prevent hammer from working freely.	400	3	
	Springfield, model 1870..	20	.....do	No remarks	400	4	Springfield...
	Ward-Burton, model 1870	20	.....do	Too hard on trigger; breech-bolt not strong enough.	700	6	
May...	Remington, model 1870..	11	.....do	Dust and rust prevent hammer from working freely.	300	2	
	Springfield, model 1870..	20	.....do	No remarks	300	3	Springfield...
	Ward-Burton, model 1870	20	.....do	Too hard on trigger; breech-bolt not strong enough.	400	3	

Company B, Ninth Infantry, Captain J. D. Devin commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. June	Remington, model 1870	11	None reported	Dust and rust prevent hammer from working freely.	300	2	Springfield	
	Springfield, model 1870	20	do	No remarks	200	1		
	Ward-Burton, model 1870	20	do	Too hard on trigger; breech-bolt not strong enough.	400	3		
July	Remington, model 1870	11	do	Dust and rust prevent hammer from working freely.	240	3	Springfield	
	Springfield, model 1870	20	do	No remarks	130	2		
	Ward-Burton, model 1870	20	do	Too hard on trigger; breech-bolt not strong enough.	400	5		
Aug	Remington, model 1870	11	do	Dust and rust prevent hammer from working freely.	300	3	Springfield	
	Springfield, model 1870	20	1 barrel bent	No remarks	200	2		
	Ward-Burton, model 1870	20	1 breech-bolt	Too hard on trigger; breech-bolt not strong enough.	300	2		
Sept	Remington, model 1870	11	None reported	Dust and rust prevent hammer from working freely.	200	2	Springfield	
	Springfield, model 1870	20	do	No remarks	200	1		
	Ward-Burton, model 1870	20	1 stock	Too hard on trigger; breech-bolt not strong enough.	180	2		
Oct	Remington, model 1870	11	None reported	Dust and rust prevent hammer from working freely.	150	2	Springfield	
	Springfield, model 1870	20	do	No remarks	150	1		
	Ward-Burton, model 1870	20	do	Mainspring becomes too weak after use	200	16		
Dec	Remington, model 1870	10	do	Dust and rust prevent hammer from working freely.	100	1	Springfield	
	Springfield, model 1870	19	do	No remarks	200	2		
	Ward-Burton, model 1870	18	do	Mainspring becomes too weak after use	200	6		
1873. Jan	Remington, model 1870	8	do	To load at half-cock; hammer to project forward more.	100	1	Springfield	
	Springfield, model 1870	32	do	No remarks	300	2		
	Ward-Burton, model 1870	17	do	Breech-bolt not strong enough; too hard on trigger; mainspring too weak.	100	3		
Feb	Remington, model 1870	8	do	To load at half-cock; hammer to project forward more.	50		Springfield	
	Springfield, model 1870	32	do	No remarks	300	2		
	Ward-Burton, model 1870	17	do	Breech-bolt not strong enough; too hard on trigger; mainspring too weak.	100	2		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	3 guard-swivels, 2 rear-sights, 1 barrel	4,400	55
Springfield, model 1870	20	2 barrels	4,515	34
Sharps, model 1870	20	1 stock	1,585	17
Ward-Burton, model 1870	20	1 stock, 2 breech-bolts	3,780	54

Company C, Ninth Infantry, Captain S. Munson commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871; Ward-Burton rifle-muskets issued March 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
May . } June. }	Remington, model 1870	20	None reported	No remarks	300			
	Springfield, model 1870	48	do	do				
	Sharps, model 1870	20	do	do				
July	Remington, model 1870	19	6 rear-sights	do	300			
	Springfield, model 1870	47	None reported	do				
	Sharps, model 1870	19	1 stock	do				
Aug	Remington, model 1870	19	None reported	do	300			
	Springfield, model 1870	47	do	do	300			
	Sharps, model 1870	19	do	do	300			
Sept	Remington, model 1870	19	do	do	900			
	Springfield, model 1870	47	do	do				
	Sharps, model 1870	19	do	do				
Oct	Remington, model 1870	18	1 burnt	do	800			
	Springfield, model 1870	46	2 burnt	do				
	Sharps, model 1870	18	do	do				
Nov	Remington, model 1870	18	None reported	do				
	Springfield, model 1870	46	do	do	900			
	Sharps, model 1870	18	do	do				
Dec	Remington, model 1870	18	1 burnt	do				
	Springfield, model 1870	46	2 burnt	do	900			
	Sharps, model 1870	18	do	do				
1872.								
Jan	Remington, model 1870	10	None reported	do				
	Springfield, model 1870	41	1 firing-pin spring	do				
	Sharps, model 1870	14	1 band-spring	do				

Company C, Ninth Infantry, Captain S. Munson commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
May	Remington, model 1870	10	None reported	No remarks				
	Springfield, model 1870	38	do	do				
	Ward-Burton, model 1870	19	do	Inferior to either Remington or Springfield				
June	Remington, model 1870	9	do	No remarks				
	Springfield, model 1870	39	do	do				
	Ward-Burton, model 1870	19	do	Inferior to either Remington or Springfield				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	6 rear-sights	300	
Springfield, model 1870	48	1 firing-pin spring	2,100	
Sharps, model 1870	20	1 stock, 1 band-spring	300	
Ward-Burton, model 1870	19	None reported		

Company E, Ninth Infantry, Captain Edwin Pollock commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871; Ward-Burton rifle-muskets issued March 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
July	Remington, model 1870	20	None reported	Lengthen cleaning-rod	24		Springfield	
	Springfield, model 1870	20	1 barrel burst	No remarks	51			
	Sharps, model 1870	20	1 butt-stock	Lengthen cleaning-rod; change lower swivel.	18			

Aug ...	Remington, model 1870..	20	None reported	No remarks	9	.....	Springfield...	
	Springfield, model 1870..	20	do	do	54	.....		
	Sharps, model 1870	20	do	do	27	.....		
Oct	Remington, model 1870..	20	do	do	15	.....	Springfield...	
	Springfield, model 1870..	20	do	do	30	.....		
	Sharps, model 1870	20	do	do	21	.....		
1872.								
Sept ...	Remington, model 1870..	20	do	Suggests withdrawal of Remington and Ward-Burton arms.	300	70	Springfield...	
	Springfield, model 1870..	36	do	No remarks	200	15		
	Ward-Burton, model 1870	20	do	do	200	50		
Dec....	Remington, model 1870..	20	do	Suggests withdrawal of Remington and Ward-Burton arms.	160	15	Springfield...	
	Springfield, model 1870.	36	do	No remarks	350	15		
	Ward-Burton, model 1870	20	do	do	200	30		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	None reported	508	85
Springfield, model 1870	20	1 barrel burst	731	30
Sharps, model 1870	20	1 butt-stock	66	.....
Ward-Burton, model 1870	20	None reported	400	80

Company D, Ninth Infantry, Captain P. A. Owen commanding; Sharps rifle-muskets issued April 24, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1873.								
Jan	Springfield, model 1870..	48	2 rear-sights	No remarks	321	.....	Springfield ..	
	Sharps, model 1870	14	1 lever-key	do	90	.....		

Company G, Ninth Infantry, Captain T. B. Burrowes commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871; Ward-Burton rifle-muskets issued March 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. Sept	Remington, model 1870	20	None reported	Loading at full cock is an insuperable objection.	210	5	Springfield	Springfield far superior in accurate shooting qualities.
	Springfield, model 1870	20	do	To have elongated bright-metal front-sight and double ejector-spring.	210	3		
	Sharps, model 1870	20	do	Unwieldy; gun-sling in the way	200	3		
Nov	Remington, model 1870	19	do	Dangerous in the hands of troops with double-rank formation.	125	7	Springfield	
	Springfield, model 1870	20	do	To have elongated bright-metal front-sight and double ejector-spring.	125			
	Sharps, model 1870	20	do	Breech-block easily affected by changes of temperature.	125			
1872. Feb	Remington, model 1870	19	do	To be made to load at half-cock; more efficient extractor.	900	6	Springfield	Substitute a swell for shoulder on ramrods. Encircle muzzle of barrels with ring of steel.
	Springfield, model 1870	19	do	To have elongated bright-metal front-sight and double ejector-spring.	500	1		
	Sharps, model 1870	20	do	Move lower swivel forward	700	3		
March	Remington, model 1870	19	do	To be made to load at half-cock; more efficient extractor.			Springfield	
	Springfield, model 1870	19	do	To have elongated bright-metal front-sight and double ejector-spring.				
	Ward-Burton, model 1870	20	do	Alter the extractor; "hook" too sharp; too hard on trigger.	600	3		
May	Remington, model 1870	18	do	To be made to load at half-cock; more efficient extractor.	300		Springfield	
	Springfield, model 1870	19	do	To have elongated bright-metal front-sight and double ejector-spring.	400			
	Ward-Burton, model 1870	20	do	Alter the extractor; "hook" too sharp; too hard on trigger.	300			
June	Remington, model 1870	18	2 rear-sights	To be made to load at half-cock; more efficient extractor.	200		Springfield	
	Springfield, model 1870	19	None reported	To have elongated bright-metal front-sight and double ejector-spring.	200			
	Ward-Burton, model 1870	20	1 breech-bolt, 3 trigger-stop scr'ws	Too complicated; recoil very great	200			
Sept	Remington, model 1870	17	None reported	To be made to load at half cock; more efficient extractor.	140		Springfield	1 Remington rendered unserviceable by body of cartridge sticking in bore.
	Springfield, model 1870	19	do	To have elongated bright-metal front-sight and double ejector-spring.	460	1		
	Ward-Burton, model 1870	20	do	Too complicated; recoil very great	200			

1873. Jan....	Remington, model 1870..	17	.....do	Remington to load at half-cock, and longer firing-pin.	150	7	Springfield...	Lieutenant W. S. Wyatt commanding.
	Springfield, model 1870..	19	.....do	For all arms substitute a swell for shoulder on ramrod. Encircle them with band of chilled steel for front-sight.	150	.....		
	Ward-Burton, model 1870	20	.....do	Entire discontinuance of use as well as issue.	100	3		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	2 rear-sights	2,025	25
Springfield, model 1870	20	None reported	2,045	5
Sharps, model 1870	20	.....do	1,025	6
Ward-Burton, model 1870	20	1 breech-bolt, 3 trigger-stop screws	1,400	6

Company A, Tenth Infantry, Captain F. E. Lacey commanding; Remington, Springfield, and Sharps rifle-muskets issued July 17, 1871; Ward-Burton rifle-muskets issued May 1, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. Aug ...	Remington, model 1870..	20	None reported	To load at half-cock	20	.....	Springfield...	
	Springfield, model 1870..	20	.....do	No remarks	20	.....		
	Sharps, model 1870	20	.....do	Mechanism too much exposed to sand and rust; attachment of gun-sling awkward.	20	.....		
Sept ...	Remington, model 1870..	20	.....do	No remarks	.....	.....	Springfield...	
	Springfield, model 1870..	20	.....do	.....do	.....	.....		
	Sharps, model 1870	20	.....do	.....do	.....	.....		
Oct	Remington, model 1870..	20	.....do	.....do	24	.....	Springfield...	
	Springfield, model 1870..	20	.....do	.....do	24	.....		
	Sharps, model 1870	20	.....do	Would consider it an advantage to be permitted to turn in the Sharps.	24	.....		
Nov ...	Remington, model 1870..	20	.....do	No remarks	40	.....	Springfield...	
	Springfield, model 1870..	20	.....do	.....do	40	.....		
	Sharps, model 1870	20	.....do	Would consider it an advantage to be permitted to turn in the Sharps.	40	.....		

Company A, Tenth Infantry, Captain F. E. Lacey commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Dec. 1872. Jan.	Remington, model 1870	20	None reported	No remarks			Springfield	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	Would consider it an advantage to be permitted to turn in the Sharps.				
Feb	Remington, model 1870	20	do	No remarks	46		Springfield	
	Springfield, model 1870	20	do	do	46			
	Sharps, model 1870	20	do	Would consider it an advantage to be permitted to turn in the Sharps.	48	8		
March	Remington, model 1870	20	do	No remarks			Springfield	
	Springfield, model 1870	19	do	do				
	Sharps, model 1870	20	do	Would consider it an advantage to be permitted to turn in the Sharps.				
April	Remington, model 1870	19	do	No remarks	50	8	Springfield	
	Springfield, model 1870	19	do	do	50	5		
	Sharps, model 1870	20	do	Would consider it an advantage to be permitted to turn in the Sharps.				
May	Remington, model 1870	19	do	No remarks			Springfield	
	Springfield, model 1870	19	do	do				
	Sharps, model 1870	20	do	Would consider it an advantage to be permitted to turn in the Sharps.				
June	Remington, model 1870	19	do	No remarks	30	2	Springfield	Lieut. W. T. Duggan commanding.
	Springfield, model 1870	18	do	do	30	3		
	Sharps, model 1870	20	do	do				
	Ward-Burton, model 1870	20	2 trigger-stop screws	do	30	6		
July Aug.	Remington, model 1870	19	None reported	do			Springfield	
	Springfield, model 1870	18	1 firing-pin	do				
	Sharps, model 1870	20	None reported	do				
	Ward-Burton, model 1870	20	do	do				
Sept	Remington, model 1870	19	do	do			Springfield	
	Springfield, model 1870	18	do	do				
	Ward-Burton, model 1870	20	do	do				
Oct	Remington, model 1870	19	do	do			Springfield	
	Springfield, model 1870	19	do	do	20	3		
	Ward-Burton, model 1870	20	do	do	20	2		
Nov	Remington, model 1870	19	do	do			Springfield	
	Springfield, model 1870	18	do	do				
	Ward-Burton, model 1870	20	do	do	40	6		
Dec	Remington, model 1870	19	do	do			Springfield	
	Springfield, model 1870	18	do	do				
	Ward-Burton, model 1870	20	do	do				
1873.								
Jan	Remington, model 1870	19	do	do	20			

	Springfield, model 1870	18	do	do	40		Springfield
	Ward-Burton, model 1870	18	2 stocks	do	40		
Feb	Remington, model 1870	19	1 stock	do	20		
	Springfield, model 1870	19	None reported	do	40		
	Ward-Burton, model 1870	18	2 stocks	do	50		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartriges failed.
Remington, model 1870	20	1 stock	250	10
Springfield, model 1870	20	1 firing-pin	310	8
Sharps, model 1870	20	None reported	132	8
Ward-Burton, model 1870	20	4 stocks, 2 trigger-stop screws	180	12

Company B, Tenth Infantry, Captain E. G. Bush commanding; Remington, Springfield, and Sharps rifle-muskets issued July 17, 1871; Ward-Burton rifle-muskets issued May 1, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. Sept	Remington, model 1870	20	1 mainspring	Longer comb to hammer; to load at half-cock.	226	2	Springfield	All arms should have rear-sights of the buckhorn pattern; hair-triggers an advantage.
	Springfield, model 1870	20	None reported	No remarks	287			
	Sharps, model 1870	20	1 stock	Gun-sling in the way; lever shaped to fit the hand; breech-block made smaller.	226	21		
Oct	Remington, model 1870	20	None reported	Longer comb to hammer; to load at half-cock.	129		Springfield	
	Springfield, model 1870	20	do	No remarks	256			
	Sharps, model 1870	19	1 firing-bolt	Gun-sling in the way; lever shaped to fit the hand; breech-block made smaller.	176			
Nov	Remington, model 1870	20	None reported	To have stronger ejector; should be locked when loaded; easier on trigger; trigger should not be used as sear.	120	3	Springfield	
	Springfield, model 1870	20	do	To have lock in small of stock, firing-pin in center of breech-block; easier on trigger.	109	2		
	Sharps, model 1870	19	do	To have lock in small of stock, firing-pin in center of breech-block; easier on trigger.	120	4		

Company B, Tenth Infantry, Captain E. G. Bush commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. Dec....	Remington, model 1870..	20	None reported	Trigger should not be used as sear; to have stronger ejector; should be locked when loaded; easier on trigger.	79	1	Springfield...	
	Springfield, model 1870..	20	.....do	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	76	1		
	Sharps, model 1870.....	19	.....do	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	75	1		
1872. Jan....	Remington, model 1870..	20	.....do	Trigger should not be used as sear; to have stronger ejector; should be locked when loaded; easier on trigger.	42	.....	Springfield...	
	Springfield, model 1870..	20	.....do	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	163	2		
	Sharps, model 1870.....	19	.....do	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	52	.....		
Feb....	Remington, model 1870..	20	.....do	Trigger should not be used as sear; to have stronger ejector; should be locked when loaded; easier on trigger.	84	1	Springfield...	The men prefer the Springfield, as the manual is more easily executed and the recoil less.
	Springfield, model 1870..	20	.....do	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	186	.....		
	Sharps, model 1870.....	19	.....do	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	55	2		
March .	Remington, model 1870..	20	.....do	Should be locked when loaded; easier on trigger; trigger should not be used as sear; to have stronger ejector.	20	.....	Springfield...	
	Springfield, model 1870..	20	.....do	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	20	.....		
	Sharps, model 1870.....	19	.....do	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	3	.....		
April ..	Remington, model 1870..	20	.....do	Should be locked when loaded; easier on trigger; trigger should not be used as sear; to have stronger ejector.	87	2		
	Springfield, model 1870..	19	.....do	To have lock in small of stock; firing-pin	144	.....		

				in center of breech-block; easier on trigger.			Springfield.	Lieut. C. S. Davis commanding.
	Sharps, model 1870	19	do	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	103			
May	Remington, model 1870	20	do	Trigger should not be used as sear; to have stronger ejector; should be locked when loaded; easier on trigger.	63	3		
	Springfield, model 1870	19	do	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	111	1	Springfield.	Lieut. C. S. Davis commanding.
	Sharps, model 1870	19	1 mainspring, 1 sight	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	78	4		
June	Remington, model 1870	20	None reported	Trigger should not be used as sear; to have stronger ejector; should be locked when loaded; easier on trigger.	250	1		
	Springfield, model 1870	19	do	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	370		Springfield.	Lieut. C. S. Davis commanding.
	Sharps, model 1870		do	No remarks	192			
	Ward-Burton, mod. 1870	20	do	Firing-pin to be heavier and harder near point; easier on trigger.	219	17		
July	Remington, model 1870	20	do	Trigger should not be used as sear; to have stronger ejector; should be locked when loaded; easier on trigger.	48	1		
	Springfield, model 1870	20	do	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	51		Springfield.	Lieut. C. S. Davis commanding.
	Ward-Burton, mod. 1870	20	do	Firing-pin to be heavier and harder near the point; easier on trigger.	66	5		
Aug	Remington, model 1870	20	1 extractor	Trigger should not be used as sear; to have stronger ejector; should be locked when loaded; easier on trigger.	37	2		
	Springfield, model 1870	20	2 extractor-springs, 2 cam-latch springs.	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	50		Springfield.	Lieut. C. S. Davis commanding.
	Ward-Burton, mod. 1870	20	1 mainspring, 2 firing-pins, 1 extractor, 1 locking-bolt spring.	Firing-pin to be heavier and harder near the point; easier on trigger.	183	18		
Oct	Remington, model 1870	20	2 butt-stocks, 3 rear-sight leaves.	Trigger should not be used as sear; to have stronger ejector; should be locked when loaded; easier when loaded.	21			
	Springfield, model 1870	20	1 barrel burst	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	26		Springfield.	Lieut. C. S. Davis commanding.
	Ward-Burton, mod. 1870	20	1 guard-screw, 2 mainsprings	Firing-pin to be heavier and harder near the point; easier on trigger.	40	10		

Company B, Tenth Infantry, Captain E. G. Bush commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
Nov ...	Remington, model 1870..	20	1 stock broken; ramrod lost; barrel damaged.	Trigger should not be used as sear; to have stronger ejector; should be locked when loaded; easier on trigger.	27	1	Springfield...	
	Springfield, model 1870..	20	None reported	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	33	2		
	Ward-Burton, mod. 1870.	20	.....do	Too poor a system to be countenanced...	30	4		
Dec ...	Remington, model 1870..	16	2 firing-pins, 2 firing-pin springs.	Trigger should not be used as sear; to have stronger ejector; should be locked when loaded; easier on trigger.	125	4	Springfield...	
	Springfield, model 1870..	19	2 breech-bolt cap-screws, 2 firing-pin springs.	To have lock in small of stock; firing-pin in center of breech-block; easier on trigger.	150	.....		
	Ward-Burton, mod. 1870.	18	1 ejector, 1 locking-bolt, 1 locking-bolt lever.	No remarks	125	11		
1873.								
Jan ...	Remington, model 1870..	16	None reported	.....do	60	.....	Springfield...	
	Springfield, model 1870..	19	.....do	.....do	70	.....		
	Ward-Burton, mod. 1870.	18	1 trigger-stop screw.	.....do	70	.....		
Feb ...	Remington, model 1870..	16	None reported	.....do	64	.....	Springfield...	
	Springfield, model 1870..	19	.....do	.....do	80	.....		
	Ward-Burton, mod. 1870.	18	.....do	Dangerous, because cocked by action of loading.	50	.....		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 mainspring, 1 extractor, 3 butt-stocks, 2 firing-pins, 2 firing-pin springs, 3 rear-sight leaves, 1 ramrod, 1 barrel damaged.	1,482	22
Springfield, model 1870	20	2 ejector-springs, 2 cam-latch springs, 1 barrel, 2 breech-block cap-screws, 2 firing-pin springs..	2,173	8
Sharps, model 1870	20	1 firing-bolt, 1 mainspring, 1 sight	1,080	32
Ward-Burton, model 1870	20	3 mainsprings, 2 firing-pins, 1 guard-screw, 1 locking-bolt, 1 locking-bolt screw, 1 trigger-stop screw, 2 extractors, 1 locking-bolt spring.	783	65

Company C, Tenth Infantry, Captain N. Prime commanding; Remington, Springfield, and Sharps rifle-muskets issued July 17, 1871; Ward-Burton rifle-muskets issued May 1, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Sept	Remington, model 1870	18	None reported	To load at half-cock	800	9	Springfield	
	Springfield, model 1870	18	do	No remarks	800	1		
	Sharps, model 1870	19	do	Gun-sling in the way in handling	800	14		
Nov	Remington, model 1870	18	do	To load at half-cock	165	2	Springfield	Lieut. D. H. Kelton commanding.
	Springfield, model 1870	18	do	No remarks	155	1		
	Sharps, model 1870	19	do	Gun-sling in the way in handling	150	3		
Dec	Remington, model 1870	17	do	No remarks			Springfield	Lieut. D. H. Kelton commanding.
	Springfield, model 1870	17	do	do				
	Sharps, model 1870	19	do	do				
1872.								
Jan	Remington, model 1870	17	do	do	120		Springfield	Lieut. D. H. Kelton commanding.
	Springfield, model 1870	17	do	do	120	2		
	Sharps, model 1870	19	do	do	154			
April	Remington, model 1870	17	do	do			Springfield	
	Springfield, model 1870	17	do	do				
	Sharps, model 1870	19	do	do				
Aug	Remington, model 1870	14	do	Does not eject shells well; hammer and breech-block work badly after firing.				See special report; more than ⅜ failed; the cartridges were a short time under water.
	Springfield, model 1870	13	1; wagon fell on it	No remarks	800			
	Sharps, model 1870	16	None reported	do				
	Ward-Burton, model 1870	19	1; wagon fell on it	Not at all satisfactory. (See report)				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	18	None reported	1,085	11
Springfield, model 1870	18	do	1,075	3
Sharps, model 1870	19	do	1,104	17
Ward-Burton, model 1870	19	do		

Special report made by Captain N. Prime, Tenth Infantry, August, 1872.—From practical experience on escort duty, I find the following defects in the rifles in the hands of my company:

The Remington will not eject the shell; besides, after firing a few times, the hammer and breech-piece do not work well, the breech-piece sticks, and it is difficult to remove the old shell; it is also a great objection not being able to load the piece at half-cock.

The Ward-Burton is not at all satisfactory as a service arm. The little catch on the side of the lock is liable at all times to get clogged; if dust or sand is blowing it is impossible to keep it in order; a very small particle of sand will necessitate taking the whole thing apart; also the spiral spring is most decidedly an objection. The enlisted men complain that it is unserviceable, and generally consider it a dangerous arm; cocking itself when loaded is certainly a great objection.

The Sharps rifle has not been in use in my company during the last month.

Company D, Tenth Infantry, Captain E. E. Sellers commanding; Sharps rifle-muskets issued November 6, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
	Sharps, model 1870	16	None reported	Inferior to Springfield, being heavier, not so accurate, and more complicated.	.....	.....	Springfield	

Company A, Eleventh Infantry, Captain George L. Choisy commanding; Remington, Springfield, and Sharps rifle-muskets issued July 17, 1871; *Ward-Burton rifle-muskets issued May* 1, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Sept	Remington, model 1870	20	None reported	No remarks	60	2	Springfield	
	Springfield, model 1870	20	do	do	80	3		
	Sharps, model 1870	20	do	do	60	3		
Oct	Remington, model 1870	20	do	To load at half-cock; does not always eject.	64	3	Springfield	
	Springfield, model 1870	20	do	No remarks	57	3		
	Sharps, model 1870	20	do	Does not always eject	51	3		
Nov	Remington, model 1870	20	do	To load at half-cock; does not always eject.	46	1	Springfield	
	Springfield, model 1870	20	do	No remarks	109	8		
	Sharps, model 1870	20	do	Difference between half-cock and full-cock not sufficient; lever in the way.	64	6		
Dec	Remington, model 1870	20	1 barrel bulged out	To load at half-cock; does not always eject.	40	.....	Springfield	The Remington cannot be loaded and fired as rapidly as the Springfield.
	Springfield, model 1870	20	None reported	No remarks	80	.....		
	Sharps, model 1870	20	do	Difference between half-cock and full-cock not sufficient; lever in the way.	50	.....		
1872.								
Jan	Remington, model 1870	19	1 firing-pin	To load at half-cock; does not always eject.	50	.....	Springfield	
	Springfield, model 1870	19	1 barrel bulged out	No remarks	81	1		
	Sharps, model 1870	20	None reported	Difference between half-cock and full-cock not sufficient; lever in the way.	50	.....		

Feb.	Remington, model 1870	19	do	To load at half-cock; does not always eject.	48	2	Springfield	Barrels became heated after firing a few shots.
	Springfield, model 1870	19	do	No remarks	64			
	Sharps, model 1870	19	1 tumbler	Difference between half-cock and full-cock not sufficient; lever in the way.	80	2		
March	Remington, model 1870	19	None reported	To load at half-cock; does not always eject.	25		Springfield	
	Springfield, model 1870	19	do	No remarks	25			
	Sharps, model 1870	19	do	Difference between half-cock and full-cock not sufficient; lever in the way.	35			
April	Remington, model 1870	19	do	To load at half-cock; does not always eject.	30	2	Springfield	
	Springfield, model 1870	19	do	No remarks	35	4		
	Sharps, model 1870	19	1 stock, 1 lever	Difference between half-cock and full-cock not sufficient; lever in the way.	20	3		
May	Remington, model 1870	19	None reported	To load at half-cock; does not always eject.	36		Springfield	
	Springfield, model 1870	19	do	No remarks	60			
	Sharps, model 1870	17	do	Difference between half-cock and full-cock not sufficient; lever in the way.	34	2		
June	Remington, model 1870	19	do	To load at half-cock; does not always eject.	142		Springfield	
	Springfield, model 1870	19	do	No remarks	132			
	Sharps, model 1870	17	do	Difference between half-cock and full-cock not sufficient; lever in the way.	136	1		
	Ward-Burton, model 1870	20	do	No remarks				
July	Remington, model 1870	19	1 mainspring	To load at half-cock; does not always eject.			Springfield	
	Springfield, model 1870	19	None reported	No remarks				
	Ward-Burton, model 1870	20	do	Too complicated; dangerous in hands of careless men.				
Aug	Remington, model 1870	19	do	To load at half-cock; does not always eject.	40		Springfield	
	Springfield, model 1870	19	do	No remarks	60			
	Ward-Burton, model 1870	20	do	Too complicated; dangerous in hands of careless men.	140			
Sept	Remington, model 1870	19	do	To load at half-cock; does not always eject.	50	2	Springfield	
	Springfield, model 1870	19	do	No remarks	70	3		
	Ward-Burton, model 1870	20	do	Sometimes impossible to fire until breech-bolt was pulled back twice.	120	5		
Oct	Remington, model 1870	19	do	To load at half-cock; does not always eject.	40		Springfield	1 cartridge struck 7 times in Ward-Burton and failed; went in Springfield.
	Springfield, model 1870	19	1 burnt	No remarks	70			
	Ward-Burton, model 1870	20	None reported	Sometimes impossible to fire until breech-bolt was pulled back twice.	65	2		
Nov	Remington, model 1870	19	do	To load at half-cock; does not always eject.	20	1	Springfield	
	Springfield, model 1870	19	1 sight, 1 barrel injured	No remarks	48	2		
	Ward-Burton, model 1870	20	1 guard-screw	Sometimes impossible to fire until breech-bolt was pulled back twice.	70	13		

Company A, Eleventh Infantry, Captain George L. Choisy commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
Dec....	Remington, model 1870..	19	1 firing-pin spring.....	Should load at half-cock.....	.....	.....	Springfield...	
	Springfield, model 1870..	19	1 mainspring.....	No remarks.....	.....	.....		
	Ward-Burton, model 1870	20	.....do.....	Too complicated.....	.....	.....		
1873.								
Jan....	Remington, model 1870..	19	None reported.....	Should load at half-cock.....	50	.....	Springfield...	
	Springfield, model 1870..	19	.....do.....	No remarks.....	50	.....		
	Ward-Burton, model 1870	20	1 sear-bolt.....	Too complicated.....	50	1		
Feb....	Remington, model 1870..	19	None reported.....	Should load at half-cock.....	40	.....	Springfield...	
	Springfield, model 1870..	19	.....do.....	No remarks.....	90	.....		
	Ward-Burton, model 1870	20	.....do.....	Locking-bolt spring frequently clogged by dust.	80	.....		

TOTALS.

Kinds of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870.....	20	1 firing-pin spring, 1 firing-pin, 1 barrel, 1 mainspring.....	781	13
Springfield, model 1870.....	20	1 mainspring, 1 barrel, 1 barrel injured, 1 rear-sight.....	1,111	24
Sharps, model 1870.....	20	1 tumbler, 1 stock, 1 lever.....	580	20
Ward-Burton, model 1870.....	20	1 sear-bolt, 1 guard-screw, 1 mainspring.....	525	20

Company B, Eleventh Infantry, Captain Joseph Conrad commanding; Remington, Springfield, and Sharps rifle-muskets issued July 17, 1871; *Ward-Burton rifle-muskets issued May* 1, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Oct....	Remington, model 1870..	20	None reported.....	No remarks.....	.....	.....	.....	
	Springfield, model 1870..	20	.....do.....	.....do.....	.....	.....	.....	
	Sharps, model 1870.....	19	.....do.....	.....do.....	.....	.....	.....	

Nov ...	Remington, model 1870..	20	.....do	To load at half-cock			Springfield...	
	Springfield, model 1870..	20	.....do	No remarks				
	Sharps, model 1870	19	.....do	Too heavy; gun-sling cannot be used				
Dec....	Remington, model 1870..	20	.....do	No remarks			Springfield...	
	Springfield, model 1870..	20	.....do	.....do				
	Sharps, model 1870	19	.....do	.....do				
1872.								
Jan....	Remington, model 1870..	20	.....do	.....do	300	11	Springfield...	
	Springfield, model 1870..	20	.....do	.....do	300	5		
	Sharps, model 1870	19	.....do	.....do	300	9		
Feb....	Remington, model 1870..	19	.....do	.....do	600	50	Springfield...	
	Springfield, model 1870..	20	.....do	.....do	600	19		
	Sharps, model 1870	19	.....do	.....do	600	23		
March .	Remington, model 1870..	19	.....do	.....do	400	35	Springfield...	
	Springfield, model 1870..	20	.....do	.....do	400	20		
	Sharps, model 1870	19	.....do	.....do	400	23		
April ..	Remington, model 1870..	18	.....do	To load at half-cock	200	24	Springfield...	Lieutenant George G. Lott commanding.
	Springfield, model 1870..	20	.....do	No remarks	200	6		
	Sharps, model 1870	19	.....do	Fails to eject shells	200	10		
May ...	Remington, model 1870..	18	1 stock	To load at half-cock	100	9	Springfield...	Lieutenant George G. Lott commanding.
	Springfield, model 1870..	20	None reported	No remarks	100	3		
	Sharps, model 1870	18	.....do.	Fails to eject shells	100	3		
June...	Remington, model 1870..	18	.....do	To load at half-cock	73	1	Springfield...	1 cartridge failed in Remington and 2 in Ward-Burton, afterwards fired in Springfield.
	Springfield, model 1870..	20	.....do	No remarks	74	.....		
	Ward-Burton, model 1870	20	.....do	Greater force for mainspring	74	2		
July ...	Remington, model 1870..	18	2 butt-stocks	To load at half-cock	200	22	Springfield...	Lieutenant A. L. Myer commanding. Many cartridges failed in Ward-Burton, were fired in Springfield.
	Springfield, model 1870..	20	1 stock from carelessness	No remarks	200	2		
	Ward-Burton, model 1870	20	None reported	Greater force for mainspring	200	30		
Aug ...	Remington, model 1870..	17	3 stocks	To load at half-cock	280	14	Springfield...	Lieutenant W. C. Beach commanding. Many cartridges failed in Ward-Burton and were fired in Springfield.
	Springfield, model 1870..	19	None reported	No remarks	200	6		
	Ward-Burton, model 1870	20	.....do	Greater force for mainspring	300	35		
Sept ..	Remington, model 1870..	15	.....do	To load at half-cock	200	13	Springfield...	Lt. W. C. Beach commanding; same remarks.
	Springfield, model 1870..	18	.....do	No remarks	200	1		
	Ward-Burton, model 1870.	20	.....do	Greater force for mainspring	200	18		
Oct ...	Remington, model 1870..	17	.....do	To load at half-cock	250	13	Springfield...	Lt. W. C. Beach commanding; same remarks.
	Springfield, model 1870	19	.....do	No remarks	180	3		
	Ward-Burton, model 1870.	20	.....do	Greater force for mainspring	200	35		
Nov ...	Remington, model 1870..	8	.....do	To load at half-cock	150	.....	Springfield...	Lieut. W. C. Beach commanding.
	Springfield, model 1870..	17	.....do	No remarks	130	.....		
	Ward-Burton, model 1870.	19	.....do	Greater force for mainspring	50	2		
Dec...	Remington, model 1870..	13	.....do	To load at half-cock	190	.....	Springfield...	Lieut. W. C. Beach commanding.
	Springfield, model 1870	18	.....do	No remarks	140	.....		
	Ward-Burton, model 1870.	19	.....do	Greater force for mainspring	100	5		

Company B, Eleventh Infantry, Captain Joseph Conrad commanding—Continued.

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	6 butt-stocks	2,943	192
Springfield, model 1870	20	1 stock	2,724	65
Sharps, model 1870	20	None reported	1,874	100
Ward-Burton, model 1870	20	do	850	95

Company D, Eleventh Infantry, Captain H. L. Chipman commanding; Remington, Springfield, and Sharps rifle-muskets issued July 17, 1871; *Ward-Burton rifle-muskets issued May* 1, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
April	Remington, model 1870	20	None reported	Better means of ejecting the shell	174	84	Springfield	Cartridges had been damaged.
	Springfield, model 1870	20	do	No remarks	174	84		
	Sharps, model 1870	20	do	do	175	84		
May	Remington, model 1870	20	do	Better means of ejecting the shell	492	165	Springfield	Cartridges had been damaged.
	Springfield, model 1870	20	do	No remarks	492	163		
	Sharps, model 1870	20	do	do	492	163		
June	Remington, model 1870	20	do	Better means of ejecting the shell	190	139	Springfield	Lieut. Chas. F. Roe commanding; cartridges had been damaged.
	Springfield, model 1870	20	do	No remarks	320	163		
	Sharps, model 1870	20	do	do	210	158		
July	Remington, model 1870	20	do	Better means of ejecting the shell	300	81	Springfield	Lieut. Chas. F. Roe commanding.
	Springfield, model 1870	20	do	No remarks	310	98		
	Sharps, model 1870	20	do	Some method of ejecting the shell	290	106		
Aug	Remington, model 1870	19	do	Better means of ejecting the shell	360	44	Springfield	Lieut. Charles F. Roe commanding.
	Springfield, model 1870	20	do	No remarks	320	32		
	Sharps, model 1870	20	do	Some method of ejecting the shell.	260	48		
Sept	Remington, model 1870	19	do	Better means of ejecting the shell	720	88	Springfield	Lieut. Charles F. Roe commanding.
	Springfield, model 1870	20	1 stock	No remarks	672	72		
	Sharps, model 1870	20	None reported	Some method of ejecting the shell	646	84		
	Ward-Burton, model 1870	20	do	No remarks				
Oct	Remington, model 1870	19	do	Better means of ejecting the shell	280	2	Springfield	Lieut. Charles F. Roe commanding.
	Springfield, model 1870	20	do	No remarks	368			
	Sharps, model 1870	20	do	Some method of ejecting the shell				
	Ward-Burton, model 1870	20	do	No remarks	332	2		

Nov	Remington, model 1870	19	do	Better means of ejecting the shell	290	4	Springfield
	Springfield, model 1870	20	do	No remarks	340	2	
	Sharps, model 1870	20	do	Some method of ejecting the shell			
	Ward-Burton, model 1870	20	do	No remarks	430	6	
Dec	Remington, model 1870	19	1 mainspring	Some method of ejecting the shell	290	10	Springfield
	Springfield, model 1870	19	None reported	No remarks	230	8	
	Sharps, model 1870	20	do	do			
	Ward-Burton, model 1870	20	do	do	315	15	
1873.							
Jan	Remington, model 1870	19	do	Some method of ejecting the shell	112	15	Springfield
	Springfield, model 1870	19	do	No remarks	100	9	
	Ward-Burton, model 1870	20	do	do	112	28	
Feb	Remington, model 1870	19	do	Some method of ejecting the shell	135	17	Springfield
	Springfield, model 1870	19	do	No remarks	150	8	
	Ward-Burton, model 1870	20	do	do	150	25	

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 mainspring	3,343	649
Springfield, model 1870	20	1 stock	3,476	681
Sharps, model 1870	20	None reported	2,073	643
Ward-Burton, model 1870	20	do	1,329	76

Company H, Eleventh Infantry, Captain R. McClermont commanding; Remington, Springfield, and Sharps rifle-muskets issued July 17, 1871.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
Sept	Springfield, model 1870	50	None reported	No remarks			Springfield	Cartridges which fail in Sharps are fired in Springfield.
	Sharps, model 1870	14	do	Lower swivel be removed; stronger mainspring.	236	6		
1873.								
Jan	Springfield, model 1870	48	do	No remarks	10	1	Springfield	
	Sharps, model 1870	12	do	Lower swivel be removed; stronger mainspring.	30	7		

Company H, Eleventh Infantry, Captain R. McClermont commanding—Continued.

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Springfield, model 1870	50	None reported	10	1
Sharps, model 1870	14	do	30	7

Company A, Twelfth Infantry, Captain E. C. Woodruff commanding.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
	Springfield, model 1870	57	None reported	No remarks	375			

Company E, Twelfth Infantry, Captain Richard C. Parker commanding; Remington, Springfield, and Sharps rifle-muskets issued June 2, 1871; Ward-Burton rifle-muskets issued June 7, 1872.

1871.								
July	Remington, model 1870	19	Lost by desertion	No remarks	96			
	Springfield, model 1870	20	None reported	do	96			
	Sharps, model 1870	20	do	do	96			
Aug	Remington, model 1870	19	do	do	128		Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	128			
	Sharps, model 1870	20	do	do	128			
Sept	Remington, model 1870	19	do	do	30	1	Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	30			
	Sharps, model 1870	20	do	do	30	2		
Oct	Remington, model 1870	19	do	do	62	2	Remington, if made to load at half-cock.	Lieutenant T. F. Wright commanding.
	Springfield, model 1870	20	do	do	66			
	Sharps, model 1870	20	do	do	66			
Nov	Remington, model 1870	19	do	do	128		Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	80			
	Sharps, model 1870	20	do	do	92			

Dec.	Remington, model 1870	19	do	do	122	2	Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	130			
	Sharps, model 1870	20	1 guard	do	130	1		
1872.								
Jan.	Remington, model 1870	19	None reported	do	57		Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	63			
	Sharps, model 1870	20	do	do	63			
Feb.	Remington, model 1870	19	do	do			Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	20	do	do				
March	Remington, model 1870	19	do	do	120		Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	131	1		
	Sharps, model 1870	20	do	do	131	2		
April	Remington, model 1870	19	do	do	114		Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	123			
	Sharps, model 1870	20	1 broken	do	123	2		
May	Remington, model 1870	18	1 lost	do	42		Remington, if made to load at half-cock.	
	Springfield, model 1870	20	None reported	do	54			
	Sharps, model 1870	20	1 broken	do	54			
June	Remington, model 1870	18	None reported	do	70		Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	98			
	Sharps, model 1870	20	do	do	80			
July	Remington, model 1870	18	do	do	49		Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	66			
	Sharps, model 1870	20	do	do	56	2		
Aug.	Remington, model 1870	18	do	do	120		Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	140			
	Ward-Burton, model 1870	20	do	do	140			
Sept.	Remington, model 1870	18	do	do	60		Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	90			
	Ward-Burton, model 1870	20	do	do	90	2		
Oct.	Remington, model 1870	18	do	do	78		Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	93			
	Ward-Burton, model 1870	20	do	do	93	2		
Nov.	Remington, model 1870	18	do	do	68		Remington, if made to load at half-cock.	
	Springfield, model 1870	20	do	do	84			
	Ward-Burton, model 1870	20	do	do	84			
Dec.	Remington, model 1870	18	2 rear-sights	do	70	3	Remington, if made to load at half-cock.	Lieut. T. F. Wright commanding.
	Springfield, model 1870	20	None reported	do	80			
	Ward-Burton, model 1870	20	2 guard-screws	do	80	5		

Company E, Twelfth Infantry, Captain Richard C. Parker commanding—Continued.

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	2 rear-sights	1,414	8
Springfield, model 1870	20	None reported	1,552	1
Sharps, model 1870	20	1 guard	1,049	9
Ward-Burton, model 1870	20	2 guard-screws	477	7

Company H, Twelfth Infantry, Captain M. H. Stacey commanding; Remington, Springfield, and Sharps rifle-muskets issued June 2, 1871; Ward-Burton rifle-muskets issued June 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
June	Remington, model 1870	20	None reported	No remarks	120	20		
	Springfield, model 1870	20	do	do	120	20		
	Sharps, model 1870	20	do	do	120	31		
Nov	Remington, model 1870	20	1 mainspring	do				
	Springfield, model 1870	20	2 sear-springs	do	400	50		
	Sharps, model 1870	20	1 firing-pin	do				
Dec	Remington model 1870	20	None reported	do	130	25		
	Springfield, model 1870	20	do	do	140	20	Springfield	
	Sharps, model 1870	20	do	do	130	30		
1872.								
Jan	Remington, model 1870	20	1 firing-pin	do	60	2		
	Springfield, model 1870	20	None reported	do	60		Springfield	
	Sharps, model 1870	20	do	do	60			
Feb	Remington, model 1870	20	do	do	80	3		
	Springfield, model 1870	20	do	do	80		Springfield	
	Sharps, model 1870	20	do	do	80			
March	Remington, model 1870	20	do	do	100	3		
	Springfield, model 1870	20	do	do	100		Springfield	
	Sharps, model 1870	20	do	do	100			
April	Remington, model 1870	20	do	do	140			
	Springfield, model 1870	20	do	do	140		Springfield	
	Sharps, model 1870	20	do	do	140			

Company H, Twelfth Infantry, Captain M. H. Stacey commanding—Continued.

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 firing-pin	630	53
Springfield, model 1870	20	None reported	640	40
Sharps, model 1870	20	do	630	61

Company I, Twelfth Infantry, Captain E. F. Thompson commanding; Remington, Springfield, and Sharps rifle-muskets issued June 2, 1871; Ward-Burton rifle-muskets issued June 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
June.	Remington, model 1870	20	None reported	No remarks				
July	Springfield, model 1870	88	do	do	188	1	Springfield	
	Sharps, model 1870	20	do	do				
Aug	Remington, model 1870	20	do	do	124	1		
	Springfield, model 1870	80	do	do	115	1	Springfield	
	Sharps, model 1870	20	do	do	87			
Sept	Remington, model 1870	20	do	do	80			
	Springfield, model 1870	20	do	do	118	1	Springfield	
	Sharps, model 1870	20	do	do	99	1		
Oct	Remington, model 1870	20	do	do	18			
	Springfield, model 1870	20	do	do	27		Springfield	
	Sharps, model 1870	20	do	do	24			
Nov	Remington, model 1870	20	do	do	53			
	Springfield, model 1870	20	do	do	78		Springfield	
	Sharps, model 1870	20	do	do	67			
Dec	Remington, model 1870	20	do	Dangerous to load at half-cock; tiresome to carry in prescribed positions; stock too light.	35			
	Springfield, model 1870	20	do	No remarks	41		Springfield	
	Sharps, model 1870	20	do	Same as Remington, except in loading; want of power to eject; great recoil.	39			

Company I, Twelfth Infantry, Captain E. F. Thompson commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
Jan.	Remington, model 1870	20	None reported	Dangerous to load at half-cock; tiresome to carry in prescribed positions; stock too light.			Springfield	
Feb.	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	Same as Remington, except in loading; want of power to eject; great recoil.				
March	Remington, model 1870	20	do	Dangerous to load at half-cock; tiresome to carry in prescribed positions; stock too light.	45	1	Springfield	
	Springfield, model 1870	20	do	No remarks	62			
	Sharps, model 1870	20	do	Same as Remington, except in loading; want of power to eject; great recoil.	49			
April	Remington, model 1870	20	do	Dangerous to load at half-cock; tiresome to carry in prescribed positions; stock too light.	28	2	Springfield	
	Springfield, model 1870	20	do	No remarks	86			
	Sharps, model 1870	20	do	Same as Remington, except in loading; want of power to eject; great recoil.	50			
May	Remington, model 1870	20	do	Dangerous to load at half-cock; tiresome to carry in prescribed positions; stock too light.	56	9	Springfield	
	Springfield, model 1870	20	do	No remarks	80	7		
	Sharps, model 1870	20	do	Same as Remington, except in loading; want of power to eject; great recoil.	50	10		
June	Remington, model 1870	20	do	Dangerous to load at half-cock; tiresome to carry in prescribed positions; stock too light.	97	2	Springfield	
	Springfield, model 1870	20	do	No remarks	97			
	Ward-Burton, model 1870	20	do	Dangerous in the hands of inexperienced troops.	42			
July to Dec., inclusive.	Remington, model 1870	20	do	Dangerous to load at half-cock; tiresome to carry in prescribed positions; stock too light.			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Ward-Burton, model '70	20	do	Dangerous in the hands of inexperienced troops.				
1873.								
Jan.	Remington, model 1870	20	do	Dangerous to load at half-cock; tiresome to carry in prescribed positions; stock too light.			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Ward-Burton, model 1870	20	do	Dangerous, being too easily loaded				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	None reported	536	14
Springfield, model 1870	20	do	698	9
Sharps, model 1870	20	do	465	11
Ward-Burton, model 1870	20	do	42	10

Company K, Twelfth Infantry, Captain Charles S. Tripler commanding; Remington, Springfield, and Sharps rifle-muskets issued June 2, 1871; Ward-Burton rifle-muskets issued June 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
July	Remington, model 1870	20	None reported	Should load at half-cock; does not eject shells.	72		Springfield	
	Springfield, model 1870	20	1 barrel burst	No remarks	42			
	Sharps, model 1870	20	None reported	Does not eject shells; sling in the way	76			
Aug	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	52		Springfield	
	Springfield, model 1870	20	do	No remarks	82			
	Sharps, model 1870	20	do	Does not eject shells; sling in the way	88	1		
Sept	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	37	3	Springfield	
	Springfield, model 1870	20	do	No remarks	14	1		
	Sharps, model 1870	20	do	Does not eject shells; sling in the way	18			
Oct	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	80	3	Springfield	
	Springfield, model 1870	20	do	No remarks	53	4		
	Sharps, model 1870	20	do	Does not eject shells; sling in the way	64	2		
Nov	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	121	1	Springfield	
	Springfield, model 1870	20	do	No remarks	72	2		
	Sharps, model 1870	20	do	Does not eject shells; sling in the way	82	1		
Dec	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	112	1	Springfield	
	Springfield, model 1870	20	do	No remarks	58	1		
	Sharps, model 1870	20	do	Does not eject shells; sling in the way	72	1		

Company K, Twelfth Infantry, Captain Charles S. Tripler commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
Jan	Remington, model 1870	20	None reported	Should load at half-cock; does not eject shells.	54	1	Springfield	
	Springfield, model 1870	20	do	No remarks	42	2		
	Sharps, model 1870	20	do	Does not eject shells; sling in the way	47	1		
Feb	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	Does not eject shells; sling in the way				
March	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	169	3	Springfield	
	Springfield, model 1870	20	do	No remarks	127	3		
	Sharps, model 1870	20	do	Does not eject shells; sling in the way	115	2		
April	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	129	1	Springfield	
	Springfield, model 1870	20	do	No remarks	66	1		
	Sharps, model 1870	20	do	Does not eject shells; sling in the way	79	2		
May	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	96		Springfield	
	Springfield, model 1870	20	do	No remarks	94			
	Sharps, model 1870	20	do	Does not eject shells; sling in the way	72			
June	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	95		Springfield	
	Springfield, model 1870	20	do	No remarks	90			
	Sharps, model 1870	20	do	Does not eject shells; sling in the way	68			
July	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	114		Springfield	
	Springfield, model 1870	20	do	No remarks	70	1		
	Sharps, model 1870	20	do	Does not eject shells; sling in the way	56	2		
Aug	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	110		Springfield	
	Springfield, model 1870	20	do	No remarks	25	1		
	Sharps, model 1870	20	do	Does not eject shells; sling in the way	31	1		
	Ward-Burton, model 1870	20	do	Much inferior to any of the other systems.	36			
Sept	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	65		Springfield	
	Springfield, model 1870	20	do	No remarks	24			
	Ward-Burton, model 1870	20	do	Much inferior to any of the other systems.	71	1		
Oct	Remington, model 1870	20	do	Should load at half-cock; does not eject shells.	86	2	Remington, loading at half-cock.	Lieutenant T. F. Wright commanding.
	Springfield, model 1870	19	do	No remarks	40			
	Ward-Burton, model 1870	20	do	Much inferior to any of the other systems.	81			

Nov ...	Remington, model 1870..	20	.....do	Should load at half-cock; does not eject shells.	91	.....	Remington, if modified so as to load at half-cock.	Lieutenant T. F. Wright commanding.
	Springfield, model 1870..	19	.....do	No remarks	37	.....		
	Ward-Burton, model 1870	20	.....do	Much inferior to any of the other systems.	86	.....		
Dec....	Remington, model 1870..	20	.....do	Should load at half-cock; does not eject shells.	86	2	Remington, if modified so as to load at half-cock.	Lieutenant G. W. Kingsbury commanding.
	Springfield, model 1870..	19	.....do	No remarks	28	.....		
	Ward-Burton, model 1870	20	.....do	Much inferior to any of the other systems.	105	.....		
1873.								
Jan ...	Remington, model 1870..	20	.....do	Should load at half-cock and have an ejector.	72	3	.....	Lieutenant G. W. Kingsbury commanding.
	Springfield, model 1870..	19	.....do	No remarks	12	.....	.....	
	Ward-Burton, model 1870	20	.....do	Much inferior to any of the other systems.	75	3	.....	
Feb....	Remington, model 1870..	20	.....do	Should load at half-cock and have an ejector.	42	.....	.....	
	Springfield, model 1870..	19	.....do	No remarks	46	.....	.....	
	Ward-Burton, model 1870	20	.....do	Much inferior to any of the other systems.	49	.....	.....	

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20		1,683	20
Springfield, model 1870	20		1,022	16
Sharps, model 1870	20		868	13
Ward-Burton, model 1870	20		503	4

Company A, Thirteenth Infantry, Captain R. A. Torrey commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871; Ward-Burton rifle-muskets issued March 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
May ...	Remington, model 1870..	20	1 mainspring, 1 musket, (run over.)	To load at half-cock	.....	.....	Springfield...	
	Springfield, model 1870..	19	None reported	No remarks	.....	.....		
	Sharps, model 1870	20	1 barrel burst	.....do	.....	.....		
June...	Remington, model 1870..	20	None reported	.....do	.....	.....	Springfield...	
	Springfield, model 1870.	20	.....do	.....do	.....	.....		
	Sharps, model 1870	20	.....do	.....do	.....	.....		

Company A, Thirteenth Infantry, Captain R. A. Torrey commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
July	Remington, model 1870	19	None reported	No remarks	33		Springfield	
	Springfield, model 1870	19	do	do	33			
	Sharps, model 1870	19	do	do	33			
Aug	Remington, model 1870	19	do	do			Springfield	
	Springfield, model 1870	19	1 stock	do	60			
	Sharps, model 1870	19	None reported	do				
Sept	Remington, model 1870	20	do	To load at half-cock			Springfield	
	Springfield, model 1870	19	do	No remarks				
	Sharps, model 1870	20	do	do				
Oct	Remington, model 1870	20	do	do			Springfield	
	Springfield, model 1870	19	do	do				
	Sharps, model 1870	20	do	do				
Nov	Remington, model 1870	20	do	do	88		Springfield	
	Springfield, model 1870	19	do	do	140			
	Sharps, model 1870	20	do	do	90			
Dec	Remington, model 1870	20	do	do	73		Springfield	
	Springfield, model 1870	19	do	do	125			
	Sharps, model 1870	20	do	do	72			
1872.								
Jan., Feb.	Remington, model 1870	20	do	do	220		Springfield	
	Springfield, model 1870	19	do	do	260			
	Sharps, model 1870	20	do	do	220			
March	Remington, model 1870	20	do	do	222		Springfield	
	Springfield, model 1870	19	do	do	272			
	Sharps, model 1870	20	do	do	225			
April	Remington, model 1870	20	do	Mainspring should be stronger	224	19	Springfield	
	Springfield, model 1870	19	do	No remarks	224			
	Sharps, model 1870	20	do	do	224	3		
June	Remington, model 1870	20	1 mainspring	do	208	1	Springfield	
	Springfield, model 1870	19	None reported	do	208	1		
	Sharps, model 1870		do	do	148			
	Ward-Burton, mod. 1870	20	do	do	60			
July	Remington, model 1870	20	do	do	232		Springfield	
	Springfield, model 1870	19	1 stock	do	232			
	Ward-Burton, mod. 1870	20	None reported	do	232			
Aug	Remington, model 1870	20	1 chamber damaged in attempt to extract bursted shell.	do	220	2	Springfield	
	Springfield, model 1870	19	None reported	do	220			
	Ward-Burton, mod. 1870	20	do	do	220	1		

Sept ...	Remington, model 1870..	20	.....do	.....do	226	.....	Springfield...	
	Springfield, model 1870..	19	.....do	.....do	226	.....		
	Ward-Burton, mod. 1870	20	.....do	.....do	226	.....		
Oct	Remington, model 1870..	20	.....do	.....do	220	9	Springfield...	
	Springfield, model 1870..	19	.....do	.....do	220	.....		
	Ward-Burton, mod. 1870.	20	.....do	.....do	220	4		
Nov ...	Remington, model 1870..	20	.....do	.....do	225	1	Springfield...	
	Springfield, model 1870..	19	.....do	.....do	225	1		
	Ward-Burton, mod. 1870	20	.....do	.....do	225	.....		
Dec	Remington, model 1870..	20	.....do	.....do	279	2	Springfield...	
	Springfield, model 1870..	19	.....do	.....do	279	.....		
	Ward-Burton, mod. 1870.	20	.....do	.....do	279	.....		
1873.								
Jan	Remington, model 1870..	20	.....do	Mainspring too weak	216	4	Springfield...	
	Springfield, model 1870..	19	.....do	No remarks	229	1		
	Ward-Burton, mod. 1870.	20	.....do	.....do	240	4		
Feb...	Remington, model 1870..	20	1 mainspring, 1 firing-pin	Mainspring too weak	220	1	Springfield...	
	Springfield, model 1870..	19	None reported	No remarks	220	.....		
	Ward-Burton, mod. 1870	20	.....do	.....do	220	.....		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	3 mainsprings, 1 firing-pin	2,922	39
Springfield, model 1870	20	2 stocks	3,433	3
Sharps, model 1870	20	1 barrel	1,232	3
Ward-Burton, model 1870	20	None reported	1,922	9

Company C, Thirteenth Infantry, Captain A. L. Hough commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871, and Ward-Burton rifle-muskets issued March 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
May ..	Remington, model 1870..	20	None reported	No remarks	.....	.....	.....	
	Springfield, model 1870..	20	.....do	.....do	.....	.....	.....	
	Sharps, model 1870	20	.....do	.....do	.....	.....	.....	

Company C, Thirteenth Infantry, Captain A. L. Hough commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. June	Remington, model 1870	20	None reported	More powerful ejector; gun-sling swivel larger.				
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	Heavy, cumbersome, and complicated				
July	Remington, model 1870	20	do	More powerful ejector; gun-sling swivel larger.			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	Heavy, cumbersome, and complicated				
Aug	Remington, model 1870	20	do	More powerful ejector; gun-sling swivel larger.	150	2	Springfield	
	Springfield, model 1870	20	do	No remarks	200			
	Sharps, model 1870	20	do	Heavy, cumbersome, and complicated	150	3		
Nov	Remington, model 1870	20	do	More powerful ejector; gun-sling swivel larger.	300		Springfield	
	Springfield, model 1870	19	1 tumbler	No remarks	300			
	Sharps, model 1870	20	1 sear	Heavy, cumbersome, and complicated	300	2		
Dec	Remington, model 1870	19	None reported	More powerful ejector; gun-sling swivel larger.	260	1	Springfield	All fired in Springfield.
	Springfield, model 1870	20	do	No remarks	260			
	Sharps, model 1870	20	do	Heavy, cumbersome, and complicated	260	10		
1872. Feb	Remington, model 1870	19	do	More powerful ejector; gun-sling swivel larger.			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	Heavy, cumbersome, and complicated				
April	Remington, model 1870	19	3 rear-sights	More powerful ejector; gun-sling swivel larger.	400		Either Springfield or Ward-Burton.	
	Springfield, model 1870	20	None reported	No remarks	400			
	Ward-Burton, model 1870	20	1 rear-sight	do	400			
June	Remington, model 1870	19	None reported	More powerful ejector; gun-sling swivel larger.	300	1	Springfield	
	Springfield, model 1870	20	do	No remarks	300			
	Ward-Burton, model 1870	20	do	The breech-bolts foul after using several times.	300			
Aug	Remington, model 1870	19	do	No remarks	200		Springfield	
	Springfield, model 1870	20	do	More easily handled and kept clean; efficient in dust and rain.	200			
	Ward-Burton, model 1870	20	do	Cartridges discharged by sand blown into the receiver.	200			
Sept	Remington, model 1870	19	do	No remarks	300		Springfield	
	Springfield, model 1870	20	do	do	400			
	Ward-Burton, model 1870	20	do	do	300			

Oct....	Remington, model 1870..	19	.....do.....	The screw-heads of all the arms are too soft.	200	.....	Springfield...	
	Springfield, model 1870..	20	.....do.....	No remarks.....	200	.....		
	Ward-Burton, model 1870.	20	.....do.....	.....do.....	200	.....		
Nov...	Remington, model 1870..	19	1 damaged by fire.....	.....do.....	200	.....	Springfield...	
	Springfield, model 1870..	20	.....do.....	.....do.....	200	.....		
	Ward-Burton, model 1870.	20	4 damaged by fire; 2 shells in barrels immovable.	So many accidents have occurred with the Ward-Burton the men are afraid to use them. (See letter Dec. 1, below.)	100	.....		
Dec....	Remington, model 1870..	19	None reported.....	No remarks.....	250	2	Springfield...	Fired in Springfield.
	Springfield, model 1870..	20	.....do.....	.....do.....	250	.....		
	Ward-Burton, model 1870.	20	.....do.....	.....do.....	.....	.....		
1873.								
Jan....	Remington, model 1870..	18	.....do.....	.....do.....	250	10	.....	Fired in Springfield.
	Springfield, model 1870..	18	.....do.....	.....do.....	250	.....		
	Ward-Burton, model 1870.	14	.....do.....	.....do.....	.....	.....		
Feb....	Remington, model 1870..	18	.....do.....	.....do.....	125	.....	Springfield...	500 failed; in all the indentations were ¼ to ⅜ inch from the proper place.
	Springfield, model 1870..	18	.....do.....	.....do.....	125	.....		
	Ward-Burton, model 1870.	14	.....do.....	.....do.....	.....	.....		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	3 rear-sights	2,935	16
Springfield, model 1870	20	1 tumbler	2,985	.....
Sharps, model 1870	20	1 sear	710	15
Ward-Burton, model 1870	20	1 rear-sight	1,500	.....

Special report made by Captain A. L. Hough, Thirteenth Infantry, December, 1872.—In forwarding my report on breech-loading arms, &c., for the month of November, I have the honor to add that in consequence of the number of accidents occurring in using the Ward-Burton arm the men of my company are afraid to use them, and for the future, believing them to be dangerous, I shall give the preference to the other arms in target-practice.

As my reports have shown, I would prefer the Springfield to both the other arms, and would like to have that kind alone, but until the matter is decided as to what arm is to be issued, I request that I be furnished with something in place of the Ward-Burton, the Springfield of course preferred.

Company E, Thirteenth Infantry, Captain Robert Nugent commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871; Ward-Burton rifle-muskets issued March 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
June...	Remington, model 1870..	20	None reported	No remarks			Either Remington or Springfield.	
	Springfield, model 1870..	20	do	do				
	Sharps, model 1870	20	do	Gun-sling in the way in loading				
July...	Remington, model 1870..	20	do	Fails to eject shells	60		Either Remington or Springfield.	
	Springfield, model 1870..	20	do	No remarks	45			
	Sharps, model 1870	20	do	Fails to eject shells	65	2		
Aug...	Remington, model 1870..	20	do	do	75		Springfield..	
	Springfield, model 1870..	20	do	No remarks	75			
	Sharps, model 1870	20	do	Fails to eject shells	50			
Sept. Oct..	Remington, model 1870.	20	do	do			Springfield..	
	Springfield, model 1870.	20	do	No remarks				
	Sharps, model 1870	20	do	Fails to eject shells				
Dec...	Remington, model 1870..	20	1 firing-pin spring	do	110		Springfield..	
	Springfield, model 1870..	20	None reported	No remarks	110			
	Sharps, model 1870	20	1 firing-pin	Fails to eject shells	80			
1872.								
Jan....	Remington, model 1870..	20	None reported	do			Springfield..	
	Springfield, model 1870..	20	do	No remarks				
	Sharps, model 1870	20	do	Fails to eject shells				
Feb....	Remington, model 1870..	20	1 mainspring	do			Springfield...	
	Springfield, model 1870..	20	None reported	No remarks				
	Sharps, model 1870	20	do	Fails to eject shells				
April..	Remington, model 1870..	20	do	do	150		Springfield...	
	Springfield, model 1870..	21	do	No remarks	148	2		
	Ward-Burton, model 1870	20	do	do	225			
May...	Remington, model 1870..	20	do	Fails to eject shells	120	4	Springfield...	
	Springfield, model 1870..	21	do	No remarks	108	6		
	Ward-Burton, model 1870	20	do	A very good arm, preferable to Remington or Sharps.	180	4		
June...	Remington, model 1870..	20	do	Fails to eject shells	108	11	Springfield...	
	Springfield, model 1870..	21	do	No remarks	108			
	Ward-Burton, model 1870	20	do	A very good arm, preferable to Remington or Sharps.	153			
July...	Remington, model 1870..	20	do	Fails to eject shells	192	5	Springfield...	
	Springfield, model 1870..	21	do	No remarks	208	5		
	Ward-Burton, model 1870	20	do	A very good arm, preferable to Remington or Sharps.	160	6		

Sept	Remington, model 1870	20	do	Fails to eject shells	432		Springfield	
	Springfield, model 1870	21	do	No remarks	408			
	Ward-Burton, model 1870	20	do	A very good arm, preferable to Remington or Sharps.	360			
Oct	Remington, model 1870	20	do	Fails to eject shells	180	2	Springfield	
	Springfield, model 1870	21	do	No remarks	168			
	Ward-Burton, model 1870	20	do	A very good arm, preferable to Remington or Sharps.	126			
Nov	Remington, model 1870	20	do	Fails to eject shells	186		Springfield	
	Springfield, model 1870	21	do	No remarks	141			
	Ward-Burton, model 1870	20	3 breech-bolts	A dangerous and inferior musket	66			
Dec	Remington, model 1870	20	None reported	Fails to eject shells	240		Springfield	The best firing done with the Springfield.
	Springfield, model 1870	21	do	No remarks	200			
	Ward-Burton, model 1870	20	do	A dangerous and inferior musket	106			
1873.								
Jan	Remington, model 1870	20	do	Fails to eject shells	235		Springfield	
	Springfield, model 1870	21	do	No remarks	200			
	Ward-Burton, model 1870	20	do	Dangerous; 1 breech-bolt blown out, injuring the firer.				
Feb	Remington, model 1870	20	do	No remarks	201	2	Springfield	
	Springfield, model 1870	21	do	do	243			
	Ward-Burton, model 1870	17	do	do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 firing-pin spring, 1 mainspring	2,289	22
Springfield, model 1870	20	None reported	2,162	13
Sharps model 1870	20	1 firing-pin	195	2
Ward-Burton, model 1870	20	3 breech-bolts	1,376	10

Company G, Thirteenth Infantry, Captain E. W. Clift commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871; Ward-Burton rifle-muskets issued March 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. May ...	Remington, model 1870..	20	None reported	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	76	1	Springfield...	
	Springfield, model 1870..	20	do	Barrel to be bronzed	65			
	Sharps, model 1870.....	19	do	Barrel to be bronzed; guard more bent; swivel in the way; too heavy.	45			
June...	Remington, model 1870..	20	1 mainspring	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	138	3	Springfield...	
	Springfield, model 1870..	20	None reported	Barrel to be bronzed	103	3		
	Sharps, model 1870.....	19	do	Barrel to be bronzed; guard more bent; swivel in the way; too heavy.	85			
July ...	Remington, model 1870..	20	do	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	15		Springfield...	
	Springfield, model 1870..	20	do	Barrel to be bronzed	15			
	Sharps, model 1870.....	19	do	Barrel to be bronzed; guard more bent; swivel in the way; too heavy.	35			
Aug ...	Remington, model 1870..	20	2 mainsprings, 1 rear-sight slide.	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	155		Springfield...	
	Springfield, model 1870..	20	None reported	Barrel to be bronzed	81			
	Sharps, model 1870.....	19	do	Barrel to be bronzed; guard more bent; swivel in the way; too heavy.	114			
Nov ...	Remington, model 1870..	20	do	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	20	2	Springfield...	
	Springfield, model 1870..	19	do	Barrel to be bronzed	10			
	Sharps, model 1870.....	19	do	Barrel to be bronzed; guard more bent; swivel in the way; too heavy.	30	3		

1872.								
Jan.. Feb..	Remington, model 1870..	20	1 mainspring	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	.....	.....	Springfield...	
	Springfield, model 1870..	19	None reported	Barrel to be bronzed	.....	.....		
	Sharps, model 1870	19	.....do	Barrel to be bronzed; guard more bent; swivel in the way; too heavy.	.....	.....		
Mar. Apr.	Remington, model 1870..	20	.....do	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	.....	.....	Springfield...	Lieut. Benj. H. Rogers commanding.
	Springfield, model 1870..	19	.....do	Barrel to be bronzed	.....	.....		
	Ward-Burton, model 1870	20	.....do	No remarks	.....	.....		
May...	Remington, model 1870..	20	.....do	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	102	.....	Springfield...	
	Springfield, model 1870..	19	.....do	Barrel to be bronzed	126	1		
	Ward-Burton, model 1870	20	3 trigger-stop screws	Barrel, top-strap of recoil-block, and well of receiver to be bronzed.	150	.....		
June..	Remington, model 1870..	20	None reported	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	132	1	Springfield...	
	Springfield, model 1870..	19	.....do	Barrel to be bronzed	120	.....		
	Ward-Burton, model 1870	20	.....do	Barrel, top-strap of recoil-block, and well of receiver to be bronzed.	138	.....		
July...	Remington, model 1870..	20	.....do	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	153	.....	Springfield...	
	Springfield, model 1870..	19	.....do	Barrel to be bronzed	147	.....		
	Ward-Burton, model 1870	20	.....do	Barrel, top-strap of recoil-block, and well of receiver to be bronzed.	162	1		
Aug...	Remington, model 1870..	20	.....do	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	126	2	Springfield...	
	Springfield, model 1870..	19	.....do	Barrel to be bronzed	96	.....		
	Ward-Burton, model 1870	20	1 breech-bolt	Barrel, top-strap of recoil-block, and well of receiver to be bronzed.	120	.....		

Company G, Thirteenth Infantry, Captain E. W. Clift commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. Sept...	Remington, model 1870..	20	None reported	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	126		Springfield...	
	Springfield, model 1870..	19	do	Barrel to be bronzed	102			
	Ward-Burton, model 1870	20	do	The recoil-block less brittle; locking-bolt and spring accumulate dust.	138			
Oct....	Remington, model 1870..	20	do	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	147	1	Springfield...	
	Springfield, model 1870..	19	1 rear-sight leaf-screw	Barrel to be bronzed	132			
	Ward-Burton, model 1870	20	None reported	The recoil-block less brittle; locking-bolt and spring accumulate dust.	138			
Nov...	Remington, model 1870..	20	do	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	150	1	Springfield...	
	Springfield, model 1870..	19	do	Barrel to be bronzed	162			
	Ward-Burton, model 1870	20	do	The recoil-block less brittle; locking-bolt and spring accumulate dust.	147			
Dec....	Remington, model 1870..	20	do	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	141	2	Springfield...	
	Springfield, model 1870..	19	do	Barrel to be bronzed	162			
	Ward-Burton, model 1870	20	do	The recoil-block less brittle; locking-bolt and spring accumulate dust.	165	2		
1873. Jan....	Remington, model 1870..	20	do	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	159	3	Springfield...	
	Springfield, model 1870..	19	do	Barrel to be bronzed	159			
	Ward-Burton, model 1870	20	do	No remarks	183			

Feb....	Remington, model 1870..	20	.....do	Barrel, breech-block, hammer, and trigger to be bronzed; to load at half-cock; spring-ejector; stock strengthened; comb of hammer longer; guard-swivel longer.	150	2	Springfield...	
	Springfield, model 1870..	19	.....do	Barrel to be bronzed	138	1		
	Ward-Burton, model 1870	20	.....do	No remarks.....	171	1		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870.....	20	4 mainsprings, 1 rear-sight leaf-slide.....	1,801	20
Springfield, model 1870.....	20	1 rear-sight leaf-screw.....	1,618	5
Sharps, model 1870	20	None reported.....	312	3
Ward-Burton, model 1870.....	20	1 breech-bolt, 3 trigger-stop screws	1,507	4

Company I, Thirteenth Infantry, Captain J. T. McGinness commanding; Sharps rifle-muskets issued April 1, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1873. Jan....	Sharps, model 1870	19	None reported	No remarks.....	171	17	Springfield....	

Company A, Fourteenth Infantry, Captain Aug. H. Bainbridge commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871; *Ward-Burton rifle-muskets issued March* 7, 1872.

1871. June...	Remington, model 1870..	20	None reported	No remarks.....	100	.....	.....	
	Springfield, model 1870..	20	.....do	.....do	300	.....	.....	
	Sharps, model 1870	20	.....do	.....do	100	.....	.....	
July ...	Remington, model 1870..	20	.....do	.....do	100	.....	.....	
	Springfield, model 1870..	20	.....do	.....do	100	.....	.....	
	Sharps, model 1870	20	.....do	.....do	100	.....	.....	
Aug. Sept.	Remington, model 1870..	20	.....do	.....do	75	.....	.....	
	Springfield, model 1870..	20	.....do	.....do	75	4	.....	
	Sharps, model 1870	20	.....do	.....do	75	.....	.....	

Company A, Fourteenth Infantry, Captain Aug. H. Bainbridge commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Oct..	Remington, model 1870..	20	None reported	No remarks	150			
Nov.	Springfield, model 1870..	20	do	do	150			
Dec.	Sharps, model 1870	20	2 rear-sights	do	150			
1872.								
Feb....	Remington, model 1870..	20	2 rear-sights	do	200			
	Springfield, model 1870..	20	None reported	do	200			
	Sharps, model 1870	20	3 rear-sights	do	200			
April	Remington							
May.	Remington, model 1870..	20	None reported	do	250	5		
June.	Springfield, model 1870..	20	do	do	250			
	Ward-Burton, model 1870	20	do	do	250			
July...	Remington, model 1870..	20	do	do	250	8		
	Springfield, model 1870..	19	do	do	250			
	Ward-Burton, model 1870	20	do	do	250			
Aug...	Remington, model 1870..	20	do	do	250	3		
	Springfield, model 1870..	19	do	do	250			
	Ward-Burton, model 1870	19	1 rear-sight	do	250			
Oct....	Remington, model 1870..	19	None reported	do	250			
	Springfield, model 1870..	20	do	do	250			
	Ward-Burton, model 1870	19	do	do	250			
Nov...	Remington, model 1870..	19	2 rear-sights	do	250	3		
	Springfield, model 1870..	19	None reported	do	250			
	Ward-Burton, model 1870	20	do	do	250			
Dec....	Remington, model 1870..	20	1 rear-sight	do				
	Springfield, model 1870..	19	None reported	do				
	Ward-Burton, model 1870	19	do	do				
1873.								
Jan....	Remington, model 1870..	20	do	Should load at half-cock; sight improperly arranged.	218	3	Springfield...	
	Springfield, model 1870..	19	do	No remarks	218	2		
	Ward-Burton, model 1870	19	do	do	218			

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	5 rear-sights	2,968	22
Springfield, model 1870	20	None reported	3,168	6
Sharps, model 1870	20	5 rear-sights	1,000	.....
Ward-Burton, model 1870	20	1 rear-sight	1,968	.....

Company B, Fourteenth Infantry, Captain Guido Ilges commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871; Ward-Burton rifle-muskets issued March 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872. Sept	Springfield, model 1870	45	2 band-swivel screws, 1 rear-sight base-screw, 1 ejector-spring, 1 side-screw.	No remarks	255	.....	Springfield	
	Sharps, model 1870	20	None reported	Fails to eject cartridge-shells	15	10		

Company E, Fourteenth Infantry, Captain Fred. E. Trotter commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871; Ward-Burton rifle-muskets issued March 7, 1872.

1871. Nov. Dec.	Remington, model 1870	20	None reported	No remarks	.....	.....	Springfield	
	Springfield, model 1870	20	do	do	.....	.....		
	Sharps, model 1870	20	do	do	.....	.....		
1872. Feb	Remington, model 1870	20	do	To load at half-cock	.....	.....	Springfield	Ramrods to have swell instead of shoulder.
	Springfield, model 1870	20	do	No remarks	.....	.....		
	Sharps, model 1870	20	do	do	.....	.....		
April	Remington, model 1870	20	do	To load at half-cock	.....	.....	Springfield	
	Springfield, model 1870	20	do	No remarks	.....	.....		
	Sharps, model 1870	20	1 firing-pin	do	.....	.....		

Company E, Fourteenth Infantry, Captain Fred. E. Trotter commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
May	Remington, model 1870	20	1 rear-sight leaf	To load at half-cock	50	2	Springfield	
	Springfield, model 1870	20	None reported	No remarks	50	2		
	Ward-Burton, model 1870	20	do	do	50			
June	Remington, model 1870	20	do	To load at half-cock	170		Springfield	
	Springfield, model 1870	20	do	No remarks	570			
	Sharps, model 1870		do	do	60			
	Ward-Burton, model 1870	20	do	do				
Sept	Remington, model 1870	20	do	do	400		Springfield	
	Springfield, model 1870	21	do	do	400			
	Ward-Burton, model 1870	20	do	do	400	3		
Dec	Remington, model 1870	20	1 rear-sight leaf	To load at half-cock	400	2	Springfield	
	Springfield, model 1870	20	1 rear-sight leaf, 1 firing-pin	No remarks	400	1		
	Ward-Burton, model 1870	20	None reported	do	400	1		
1873.								
Jan	Remington, model 1870	20	1 stock broken	Should load at half-cock	200	4	Springfield	
	Springfield, model 1870	20	None reported	No remarks	220	2		
	Ward-Burton, model 1870	20	do	do	200	3		
Feb	Remington, model 1870	20	do	Should load at half-cock	100		Springfield	
	Springfield, model 1870	20	do	No remarks	200			
	Ward-Burton, model 1870	20	do	do	100	2		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	2 rear-sight leaves, 1 stock	1,320	8
Springfield, model 1870	20	1 rear-sight leaf, 1 firing-pin	1,840	5
Sharps, model 1870	20	1 firing-pin	60	
Ward-Burton, model 1870	20	None reported	1,150	9

Company G, Fourteenth Infantry, Captain David Krause commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871; Ward-Burton rifle-muskets issued March 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
June...	Remington, model 1870..	20	1 broken—run over by wagon ...	To load at half-cock; more force to extractor.	.....	.....	Springfield...	Rear-sights on all arms are too brittle.
	Springfield, model 1870..	19	None reported	No remarks	.....	.....		
	Sharps, model 1870	20	1 tumbler	....do	.....	.....		
July ...	Remington, model 1870..	19	None reported	To load at half-cock	66	3	Springfield...	
	Springfield, model 1870..	48	....do.....	No remarks	132	4		
	Sharps, model 1870	17	....do.....	....do	66	2		
Aug ...	Remington, model 1870..	19	....do.....	To load at half-cock	100	8	Springfield...	
	Springfield, model 1870..	48	1 rear-sight	No remarks	100	5		
	Sharps, model 1870	17	None reported	....do	100	5		
Sept ...	Remington, model 1870..	19	2 rear-sights	Firing-pin be made longer	10	3	Springfield...	
	Springfield, model 1870..	47	1 rear-sight	No remarks	30	.....		
	Sharps, model 1870	17	None reported	....do	10	.....		
Oct	Remington, model 1870..	19	....do.....	Firing-pin be made longer	70	5	Springfield...	
	Springfield, model 1870..	47	....do.....	No remarks	350	23		
	Sharps, model 1870	17	....do.....	....do	80	8		
Nov ...	Remington, model 1870..	19	....do.....	Firing-pin be made longer	70	5	Springfield...	
	Springfield, model 1870..	47	....do.....	No remarks	350	28		
	Sharps, model 1870	17	....do.....	....do	80	8		
Dec	Remington, model 1870..	19	....do.....	Firing-pin be made longer	70	.....	Springfield...	
	Springfield, model 1870..	47	....do.....	No remarks	350	14		
	Sharps, model 1870	17	....do.....	....do	80	2		
1872.								
Jan	Remington, model 1870..	19	....do.....	Firing-pin be made longer	55	18	Springfield...	
	Springfield, model 1870..	47	....do.....	No remarks	125	8		
	Sharps, model 1870	17	....do.....	....do	20	1		
Feb	Remington, model 1870..	19	1 breech-block	Firing-pin be made longer	55	7	Springfield...	One trigger catches on the half-cock notch in firing.
	Springfield, model 1870..	47	1 stock; 1 shell stuck in bore....	No remarks	125	8		
	Sharps, model 1870	17	None reported	....do	20	1		
March .	Remington, model 1870..	19	....do.....	Firing-pin be made longer	80	8	Springfield...	
	Springfield, model 1870..	47	....do.....	No remarks	155	10		
	Sharps, model 1870	17	....do.....	....do	.....	.....		
	Ward-Burton, model 1870.	20	....do.....	....do	.....	.....		
April ..	Remington, model 1870..	17	....do.....	Firing-pin be made longer	80	8	Springfield...	
	Springfield, model 1870..	45	....do.....	No remarks	155	10		
	Ward-Burton, model 1870.	20	....do.....	....do	.....	.....		
May ...	Remington, model 1870..	16	....do.....	Firing-pin be made longer	125	10	Springfield...	
	Springfield, model 1870..	44	....do.....	No remarks	265	11		
	Ward-Burton, model 1870.	18	1 stock	Breech-block liable to damage from dust, sand, &c.	110	7		

Company G, Fourteenth Infantry, Captain David Krause commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
June...	Remington, model 1870..	16	None reported	Firing-pin be made longer	128	9	Springfield...	
	Springfield, model 1870..	43	.....do	No remarks	336	16		
	Ward-Burton, model 1870.	18	.....do	Breech-block liable to damage from dust, sand, &c.	136	8		
July...	Remington, model 1870..	16	.....do	Firing-pin be made longer	175	13	Springfield...	
	Springfield, model 1870..	44	.....do	No remarks	275	15		
	Ward-Burton, model 1870.	18	.....do	Breech-block liable to damage from dust, sand, &c.	150	15		
Aug...	Remington, model 1870..	16	1 friction-spring	Firing-pin be made longer	135	13	Springfield...	
	Springfield, model 1870..	44	1 firing-pin; 1 broken; 1 lost	No remarks	205	16		
	Ward-Burton, model 1870.	18	None reported	Breech-block liable to damage from dust, sand, &c.	160	15		
Sept...	Remington, model 1870..	16	1 barrel swelled	Firing-pin be made longer	125	15	Springfield...	Prefers Remington, if improved as suggested.
	Springfield, model 1870..	42	1 run over by wagon and broken.	No remarks	245	16		
	Ward-Burton, model 1870.	18	1 stock	Breech-block liable to damage from dust, sand, &c.	80	11		
Oct....	Remington, model 1870..	16	None reported	Firing-pin be made longer	90	11	Springfield...	1 will not pull off.
	Springfield, model 1870..	42	2 stocks	No remarks	320	19		
	Ward-Burton, model 1870.	18	None reported	Continually out of order; an unsafe arm.	90	9		
Nov...	Remington, model 1870..	16	1 mainspring; 1 firing-pin	Firing-pin be made longer	110	10	Springfield...	
	Springfield, model 1870..	42	1 stock	No remarks	310	13		
	Ward-Burton, model 1870.	18	None reported	Continually out of order; an unsafe arm.	80	11		
Dec....	Remington, model 1870..	14	.....do	Firing-pin be made longer	100	10	Springfield...	
	Springfield, model 1870..	40	3 rear-sights; 2 firing-pins	No remarks	180	8		
	Ward-Burton, model 1870.	16	None reported	Continually out of order; an unsafe arm.	140	15		
1873.								
Jan....	Remington, model 1870..	14	.....do	To load at half-cock; firing-pin to be made longer.	100	6	Springfield...	
	Springfield, model 1870..	40	2 ejector-springs; 1 rear-sight	No remarks	375	9		
	Ward-Burton, model 1870.	16	1 rear-sight	Continually out of order; an unsafe arm.	100	7		
Feb....	Remington, model 1870..	14	.....do	To load at half-cock; firing-pin to be made longer.	200	8	Springfield...	
	Springfield, model 1870..	40	1 firing-pin; 2 ejector-springs	No remarks	380	12		
	Ward-Burton, model 1870.	16	1 rear-sight	Continually out of order; an unsafe arm.	100	6		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	3 rear-sights, 1 breech-block, 1 friction-spring, 1 barrel, 1 mainspring, 1 firing-pin	1,944	160
Springfield, model 1870	20	4 stocks, 6 rear-sights, 4 ejector-springs, 4 firing-pins	4,763	255
Sharps, model 1870	20	1 tumbler	456	27
Ward-Burton, model 1870	20	2 stocks, 2 rear-sights	1,146	104

Company H, Fourteenth Infantry, Captain Charles B. Atchison commanding; Sharps rifle-muskets issued March 12, 1873.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1873. March	Springfield	53	None reported	No remarks	430	.....	Springfield	
	Sharps	18	.....do	Shell should be ejected more freely	140	.....		

Company K, Fourteenth Infantry, Captain G. S. Carpenter commanding; Remington, Springfield, and Sharps rifle-muskets issued April 24, 1871; *Ward-Burton rifle-muskets issued March* 7, 1872.

1871. May	Remington, model 1870	20	None reported	Dangerous on account of loading at full-cock.	1,209	13	Remington	
	Springfield, model 1870	20	.....do	Better fit of breech-screw in receiver; cam-latch cavity less concave.	1,286	10		
	Sharps, model 1870	20	.....do	Gun-sling is in the way	1,333	12		
June	Remington, model 1870	20	.....do	Dangerous on account of loading at full-cock.	854	7	Remington	
	Springfield, model 1870	20	.....do	Better fit of breech-screw in receiver; cam-latch cavity less concave.	575	4		
	Sharps, model 1870	19	.....do	Gun-sling in the way	743	7		
July	Remington, model 1870	20	.....do	Dangerous on account of loading at full-cock.	597	4	Remington	
	Springfield, model 1870	20	.....do	Better fit of breech-screw in receiver; cam-latch cavity less concave.	705	5		
	Sharps, model 1870	19	.....do	Gun-sling in the way	572	2		

Company K, Fourteenth Infantry, Captain G. S. Carpenter commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Aug ...	Remington, model 1870..	20	None reported	Dangerous on account of loading at full-cock.	550	.....	Remington ..	Rear-sight slides should be made tighter.
	Springfield, model 1870..	20	.....do	Better fit of breech-screw in receiver; cam-latch cavity less concave.	830	.....		
	Sharps, model 1870	19	.....do	Gun-sling in the way	650	.....		
Sept ...	Remington, model 1870..	20	.....do	The firing-pin should be longer	60	4	Remington ..	
	Springfield, model 1870..	20	.....do	Better fit of breech-screw in receiver; cam-latch cavity less concave.	80	.....		
	Sharps, model 1870	19	.....do	Gun-sling in the way	40	6		
Oct	Remington, model 1870..	20	2 rear-sight leaves	The firing-pin should be longer; should load at half-cock.	260	3	Remington, if modified as suggested.	
	Springfield, model 1870..	20	1 rear-sight leaf	Better fit of breech-screw in receiver; cam-latch cavity less concave.	250	.....		
	Sharps, model 1870	19	3 rear-sight leaves, 1 tumbler...	Gun-sling in the way	150	.....		
Nov ...	Remington, model 1870..	19	None reported	No remarks	650	25	.....	
	Springfield, model 1870..	20	.....do	.....do	700	7	.....	
	Sharps, model 1870	19	1 tumbler	.....do	650	16	.....	
Dec....	Remington, model 1870..	19	1 shell stuck in the bore	.....do	450	11	Remington ..	
	Springfield, model 1870..	20	.....do	.....do	400	4		
	Sharps, model 1870	19	None reported	.....do	550	13		
1872.								
Jan	Remington, model 1870..	19	1 rear-sight leaf	.....do	400	24	Remington ..	
	Springfield, model 1870..	20	.....do	.....do	542	6		
	Sharps, model 1872	19	None reported	.....do	400	16		
Feb....	Remington, model 1870..	19	2 rear-sight leaves	.....do	410	9	Remington ..	
	Springfield, model 1870..	20	None reported	.....do	550	6		
	Sharps, model 1870	19	4 rear-sight leaves	.....do	450	11		
March .	Remington, model 1870..	19	1 side-screw	.....do	152	1	Remington ..	
	Springfield, model 1870..	20	None reported	.....do	101	1		
	Sharps, model 1870	19	.....do	.....do	250	5		
	Ward-Burton, model 1870.	20	.....do	.....do	250	2		
April ..	Remington, model 1870..	19	.....do	.....do	200	2	Remington ..	
	Springfield, model 1870..	20	.....do	.....do	250	3		
	Ward-Burton, model 1870.	20	.....do	.....do	200	2		
May ...	Remington, model 1870..	19	.....do	.....do	200	2	Remington ..	
	Springfield, model 1870..	20	.....do	.....do	200	2		
	Ward-Burton, model 1870.	19	.....do	.....do	250	3		
June...	Remington, model 1870..	19	.....do	.....do	250	3	Remington ..	
	Springfield, model 1870..	20	.....do	.....do	200	2		
	Ward-Burton, model 1870.	19	.....do	.....do	250	3		

July	Remington, model 1870	19	do	do	300	6	Remington
	Springfield, model 1870	20	do	do	250	3	
	Ward-Burton, model 1870	20	do	do	325	4	
Aug	Remington, model 1870	19	1 rear-sight leaf	do	250	3	Remington
	Springfield, model 1870	20	do	do	275	3	
	Ward-Burton, model 1870	19	do	do	200	2	
Sept	Remington, model 1870	19	1 rear-sight slide, 1 rear-sight leaf, 1 rear-sight leaf-screw.	do	275	3	Remington
	Springfield, model 1870	20	1 rear-sight screw, 1 rear-sight leaf, 1 rear-sight slide.	do	260	2	
	Ward-Burton, model 1870	19	1 rear-sight leaf-screw, 1 rear-sight leaf, 1 sight-slide.	do	275	3	
Oct	Remington, model 1870	19	1 rear-sight leaf, 1 rear-sight slide.	do	300	3	Remington
	Springfield, model 1870	20	None reported	do	175	2	
	Ward-Burton, model 1870	19	1 rear-sight leaf, 1 rear-sight slide.	do	275	3	
Nov	Remington, model 1870	19	1 firing-pin	do	300	6	Remington
	Springfield, model 1870	20	1 ejector-spring	do	275	3	
	Ward-Burton, model 1870	19	None reported	do	200	2	
Dec	Remington, model 1870	19	do	do	200	2	Remington with modifications.
	Springfield, model 1870	20	do	do	350	3	
	Ward-Burton, model 1870	19	do	do	250	3	
1873.							
Jan	Remington, model 1870	19	1 firing-pin spring	do	150	1	Remington
	Springfield, model 1870	20	1 mainspring	do	200	1	
	Ward-Burton, model 1870	19	None reported	do			
Feb	Remington, model 1870	19	1 firing-pin spring	do	200	1	Remington
	Springfield, model 1870	20	do	do	350	1	
	Ward-Burton, model 1870	19	None reported	do	225	1	

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 side-screw, 8 rear-sight leaves, 2 rear-sight slides, 1 rear-sight leaf-screw, 1 firing-pin, 2 firing-pin springs.	8,217	132
Springfield, model 1870	20	4 rear-sight leaves, 1 rear-sight slide, 1 ejector-spring, 1 rear-sight leaf-screw, 1 mainspring, 1 firing-pin spring.	8,744	68
Sharps, model 1870	20	4 rear-sight leaves, 2 tumblers	5,788	88
Ward-Burton, model 1870	20	3 rear-sight leaves, 2 rear-sight slides, 1 rear-sight leaf-screw	2,700	28

Company C, Fifteenth Infantry, Captain H. H. Humphreys commanding; Remington, Springfield, and Sharps rifle-muskets issued May 19, 1871; Ward-Burton rifle-muskets issued March 25, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Aug	Remington, model 1870	19	None reported	To load at half-cock	147	19	Springfield	Lieutenant W. T. Hartz commanding.
	Springfield, model 1870	16	do	No remarks	90	3		
	Sharps, model 1870	18	do	do	150	14		
Sept	Remington, model 1870	17	do	To load at half-cock	210	9	Springfield	Lieutenant J. W. Bear commanding.
	Springfield, model 1870	17	do	No remarks	186	9		
	Sharps, model 1870	18	do	do	280	17		
Oct. Nov.	Remington, model 1870	17	do	To load at half-cock			Springfield	Lieutenant J. W. Eckles commanding.
	Springfield, model 1870	17	1 rear-sight	No remarks				
	Sharps, model 1870	18	None reported	do				
	Remington, model 1870	17	do	To load at half-cock	110	30	Springfield	Lieutenant J. W. Eckles commanding.
	Springfield, model 1870	17	do	No remarks	110	10		
	Sharps, model 1870	18	do	do	110	30		
1872.								
Jan	Remington, model 1870	17	do	To load at half-cock	90	40	Springfield	Lieutenant J. W. Eckles commanding.
	Springfield, model 1870	17	do	No remarks	90	10		
	Sharps, model 1870	18	do	do	90	40		
Feb	Remington, model 1870	17	do	To load at half-cock	70	5	Springfield	Lieutenant J. W. Eckles commanding.
	Springfield, model 1870	17	do	No remarks	75			
	Sharps, model 1870	18	do	do	75	10		
March	Remington, model 1870	17	do	To load at half-cock	55		Springfield	Lieutenant J. W. Eckles commanding.
	Springfield, model 1870	17	do	No remarks	60			
	Sharps, model 1870	18	do	do	55			
April	Remington, model 1870	17	do	To load at half-cock			Springfield	Lieutenant J. W. Eckles commanding.
	Springfield, model 1870	17	do	No remarks				
	Sharps, model 1870	18	do	do				
May	Remington, model 1870	17	do	To load at half-cock			Springfield	
	Springfield, model 1870	16	do	No remarks				
	Sharps, model 1870	18	do	do				
June	Remington, model 1870	15	do	To load at half-cock	120		Springfield	Lieutenant J. W. Eckles commandng.
	Springfield, model 1870	17	do	No remarks	120			
	Sharps, model 1870	17	do	do	120			
July	Remington, model 1870	14	do	To load at half-cock			Springfield	Captain Henry Ellis commanding.
	Springfield, model 1870	16	do	No remarks				
	Sharps, model 1870	13	do	do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	19	None reported	802	103
Springfield, model 1870	16	1 rear-sight	731	32
Sharps, model 1870	18	None reported	880	111

Company D, Fifteenth Infantry, Captain Horace Jewett commanding; Remington, Springfield, and Sharps rifle-muskets issued May 19, 1871; *Ward-Burton rifle-muskets issued March* 25, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. July to Dec., inclusive. 1872. Jan. and Feb.	Remington, model 1870	20	None reported	To load at half-cock			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	do				
March	Remington, model 1870	20	do	To load at half-cock	260	21	Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	do				
April	Remington, model 1870	20	1 barrel	To load at half-cock			Springfield	Lieut. W. T. Hartz commanding.
	Springfield, model 1870	19	do	No remarks				
	Sharps, model 1870	19	do	do				
May	Remington, model 1870	20	None reported	To load at half-cock			Springfield	
	Springfield, model 1870	19	do	No remarks				
	Sharps, model 1870	19	do	do				
	Ward-Burton, mod. 1870	20	do	do				
June	Remington, model 1870	20	do	To load at half-cock			Springfield	
	Springfield, model 1870	27	do	No remarks				
	Sharps, model 1870	19	do	do				
	Ward-Burton, mod. 1870	20	do	do				

Company D, Fifteenth Infantry, Captain Horace Jewett commanding—Continued.

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 barrel	260	21
Springfield, model 1870	20	do		
Sharps, model 1870	20	do		
Ward-Burton, model 1870	20	None reported		

Company B, Sixteenth Infantry, Captain Arthur W. Allyn commanding; Remington, Springfield, and Sharps rifle-muskets issued April 29, 1871; Ward-Burton rifle-muskets issued March 17, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. June	Remington, model 1870	20	None reported	Enlarge guard-swivel; to load at half-cock; comb of hammer too short.	163		Sharps	
	Springfield, model 1870	20	do	Thumb piece to have more leverage; too much play to breech-block.	118	2		
	Sharps, model 1870	20	do	Lower swivel should be moved higher; should not load with hammer down.	177	1		
July	Remington, model 1870	20	1 tang-screw	Enlarge guard-swivel; to load at half-cock; comb of hammer too short.	85		Sharps	More attention should be given to sighting of arms.
	Springfield, model 1870	20	None reported	Defects noticed in last report disappearing with use.	114			
	Sharps, model 1870	20	do	No remarks	159			
Aug	Remington, model 1870	18	do	Enlarge guard-swivel; to load at half-cock; comb of hammer too short.	110		Remington	Lieut. S. K. Mahon commanding.
	Springfield, model 1870	18	do	No remarks	80			
	Sharps, model 1870	18	do	Lower swivel should be moved higher; should not load with hammer down.	80			
Sept	Remington, model 1870	18	do	Enlarge guard-swivel; to load at half-cock; comb of hammer too short.	79		Sharps	
	Springfield, model 1870	18	do	No remarks	89			
	Sharps, model 1870	18	do	Lower swivel should be moved higher; should not load with hammer down.	68			

Oct. .. Nov.	Remington, model 1870..	17	.....do	Enlarge guard-swivel; to load at half-cock; comb of hammer too short.	.....	.....	Sharps.....
	Springfield, model 1870..	18	.....do	No remarks	.....	.....	
	Sharps, model 1870.....	17	.....do	Lower swivel should be moved higher; should not load with hammer down.	.....	.....	
....	Remington, model 1870..	17	1 mainspring, 1 trigger-spring, 2 firing-pin springs, 2 firing-pin screws.	Enlarge guard-swivel; to load at half-cock; comb of hammer too short.	.....	.....	Sharps.....
	Springfield, model 1870..	18	2 mainsprings, 1 ejector-spring..	No remarks	.....	.....	
	Sharps, model 1870.....	17	1 mainspring, 2 sear-springs.....	Lower swivel should be moved higher; should not load with hammer down.	.....	.....	
1872. Jan....	Remington, model 1870..	17	None reported	Enlarge guard-swivel; to load at half-cock; comb of hammer too short.	.....	.....	Sharps.....
	Springfield, model 1870..	18	.....do	No remarks	.....	.....	
	Sharps, model 1870.....	17	1 tumbler	Lower swivel should be moved higher; should not load with hammer down.	.....	.....	
March.	Remington, model 1870..	17	None reported	Enlarge guard-swivel; to load at half-cock; comb of hammer too short.	.....	.....	Springfield...
	Springfield, model 1870..	17	.....do	No remarks	.....	.....	
	Sharps, model 1870.....	17	1 side-screw	Lower swivel should be moved higher; should not load with hammer down.	.....	.....	
April..	Remington, model 1870..	17	1 mainspring, 1 rear-sight	Enlarge guard-swivel; to load at half-cock; comb of hammer too short.	24	1	Springfield...
	Springfield, model 1870..	17	None reported	No remarks	43	1	
	Ward-Burton, model 1870	20	.....do	.....do	49	1	
May..	Remington, model 1870..	17	1 firing-pin	Enlarge guard-swivel; to load at half-cock; comb of hammer too short.	.....	.....	Springfield..
	Springfield, model 1870..	17	None reported	No remarks	.....	.....	
	Ward-Burton, model 1870	20	.....do	.....do	.....	.....	
June..	Remington, model 1870.	17	1 rear-sight	Enlarge guard-swivel; to load at half-cock; comb of hammer too short.	33	.....	Springfield...
	Springfield, model 1870..	17	None reported	No remarks	50	.....	
	Ward-Burton, model 1870	20	.....do	.....do	50	.....	
July...	Remington, model 1870..	17	1 firing-pin	Enlarge guard swivel; to load at half-cock; comb of hammer too short.	161	.....	Springfield...
	Springfield, model 1870..	17	1 rear-sight, 1 firing-pin, 1 firing-pin spring.	No remarks	133	2	
	Ward-Burton	18	None reported	.....do	361	.....	

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 tang-screw, 2 mainsprings, 1 trigger-spring, 2 firing-pins, 2 firing-pin springs, 2 firing-pin screws, 2 rear-sights.	655	1
Springfield, model 1870	20	2 mainsprings, 1 ejector-spring, 1 rear-sight, 1 firing-pin, 1 firing-pin spring	627	5
Sharps, model 1870	20	1 mainspring, 1 tumbler, 2 sear-springs, 1 side-screw	482	1
Ward-Burton, model 1870	20	None reported	460	1

Company A, Eighteenth Infantry, Captain Edgar R. Kellogg commanding; Remington, Springfield, and Sharps rifle-muskets issued April 29, 1871; Ward-Burton rifle-muskets issued March 19, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
June	Remington, model 1870	20	None reported	To load at half-cock; more efficient extractor.	150	5	Springfield	Screw heads are too soft.
	Springfield, model 1870	20	do	No remarks	150			
	Sharps, model 1870	20	1 guard-strap, 1 frame	do	150	1		Rear-sight slides are apt to fall down.
July	Remington, model 1870	20	None reported	To load at half-cock; more efficient extractor.			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	do				
Aug	Remington, model 7870	20	2 rear-sight leaves, 2 rear-sight slides.	To load at half-cock; more efficient extractor.			Springfield	
	Springfield, model 1870	20	None reported	No remarks				
	Sharps, model 1870	20	1 extractor, 1 firing-bolt, 1 main-spring, 1 tumbler-stirrup.	do				
Sept	Remington, model 1870	20	None reported	To load at half-cock; more efficient extractor.			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	1 tumbler	do				
Oct	Remington, model 1870	20	1 firing-pin, 1 firing-pin spring	To load at half-cock; more efficient extractor.			Springfield	
	Springfield, model 1870	20	None reported	No remarks				
	Sharps, model 1870	20	do	do				
Nov	Remington, model 1870	20	1 firing-pin spring	To load at half-cock; more efficient extractor.			Springfield	
	Springfield, model 1870	20	1 firing-pin, 1 main-spring swivel, 1 ejector-spring.	No remarks				
	Sharps, model 1870	20	1 hammer	do				
Dec	Remington, model 1870	20	1 firing-pin, 1 firing-pin spring, 1 rear-sight leaf, 1 rear-sight leaf-slide.	To load at half-cock; more efficient extractor.			Springfield	
	Springfield, model 1870	20	1 firing-pin spring	No remarks				
	Sharps, model 1870	20	1 tumbler-stirrup, 1 hammer	do				
1872.								
Jan	Remington, model 1870	20	1 firing-pin spring	To load at half-cock; more efficient extractor.			Springfield	
	Springfield, model 1870	20	1 firing-pin spring	No remarks				
	Sharps, model 1870	20	1 tumbler, 2 rear-sights, 2 rear-sight slides.	do				

Feb....	Remington, model 1870..	20	None reported	To load at half-cock; more efficient extractor.			Springfield.
	Springfield, model 1870..	20	2 firing-pins	No remarks			
	Sharps, model 1870	20	None reported	do			
March .	Remington, model 1870..	20	1 firing-pin	To load at half-cock; more efficient extractor.	50		Springfield.
	Springfield, model 1870..	20	2 firing-pins, 1 firing-pin spring..	No remarks	70	2	
	Sharps, model 1870		None reported	do	50		
	Ward-Burton, model 1870	20	do	Aperture in receiver too narrow for rapid insertion of cartridges.	78		
April ..	Remington, model 1870..	20	3 firing-pins, 4 firing-pin springs	To load at half-cock; more efficient extractor.	90		Springfield.
	Springfield, model 1870..	20	4 firing-pins, 6 firing-pin springs, 2 ejector-springs.	No remarks	90		
	Ward-Burton, model 1870	20	1 breech-bolt	A dangerous arm in time of war	90	6	
May ...	Remington, model 1870..	20	1 mainspring	Lower gun-swivel should be larger			Springfield...
	Springfield, model 1870..	20	2 firing-pins, 2 firing-pin springs, 1 ejector-spring.	No remarks			
	Ward-Burton, model 1870	20	None reported	A dangerous arm in time of war			
June...	Remington, model 1870..	20	1 mainspring, 1 firing-pin, 1 firing-pin spring.	Lower gun-swivel should be larger			Springfield ..
	Springfield, model 1870..	20	1 firing-pin, 2 firing-pin springs .	No remarks			
	Ward-Burton, model 1870	20	1 locking-bolt spring	A dangerous arm in time of war			
July ..	Remington, model 1870..	20	1 mainspring, 1 rear-sight, 1 firing-pin, 2 firing-pin springs.	Lower gun-swivel should be larger			Springfield ..
	Springfield, model 1870..	20	1 firing-pin	No remarks			
	Ward-Burton, model 1870	20	1 locking-bolt spring	A dangerous arm in time of war			
Aug ...	Remington, model 1870.	20	1 mainspring, 2 firing-pin springs,	Lower gun-swivel should be larger			Springfield ..
	Springfield, model 1870.	20	1 firing-pin	No remarks			
	Ward-Burton, model 1870	20	None reported	A dangerous arm in time of war			

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 rear-sight, 3 rear-sight leaves, 3 rear-sight leaf-slides, 9 firing-pins, 15 firing-pin springs, 4 mainsprings.	290	5
Springfield, model 1870	20	1 mainspring-swivel, 14 firing-pins, 13 firing-pin springs, 4 ejector-springs	310	2
Sharps, model 1870	20	1 guard-strap, 1 receiver, 1 extractor, 1 firing-bolt, 1 mainspring, 2 tumbler-stirrups, 2 tumblers, 2 hammers, 2 rear-sights, 2 rear-sight slides.	200	1
Ward-Burton, model 1870	20	1 breech-bolt, 2 locking-bolt springs	168	6

Company E, Eighteenth Infantry, Captain Jacob Kline commanding; Remington, Springfield, and Sharps rifle-muskets issued April 29, 1871; Ward-Burton rifle-muskets issued March 19, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871. May	Remington, model 1870	20	1 firing-pin spring, 1 ejector-spring.	To load at half-cock			Springfield	
	Springfield, model 1870	20	None reported	No remarks				
	Sharps, model 1870	20	do	do				
June	Remington, model 1870	20	1 firing-pin, 1 extractor	To load at half-cock			Springfield	
	Springfield, model 1870	20	None reported	No remarks				
	Sharps, model 1870	20	2 firing-pins	do				
Aug	Remington, model 1870	20	None reported	To load at half-cock			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	do				
Sept	Remington, model 1870	20	do	To load at half-cock			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	1 tip-stock	do				
Oct	Remington, model 1870	20	1 stock	To load at half-cock			Springfield	
	Springfield, model 1870	20	None reported	No remarks				
	Sharps, model 1870	20	do	Gun-sling in the way				
Nov	Remington, model 1870	20	Quite a number of firing-pins	Difficult to extract the shells			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	None reported	Difficult to extract the shells				
Dec. 1872. Feb.	Remington, model 1870	20	do	do			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	Difficult to extract the shells				
March	Remington, model 1870	20	do	do			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	Difficult to extract the shells				
	Ward-Burton, model 1870	20	do	No remarks				
April	Remington, model 1870	19	do	Difficult to extract the shells			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Ward-Burton, model 1870	20	do	do				
May	Remington, model 1870	20	1 rear-sight	Difficult to extract the shells			Springfield	
	Springfield, model 1870	20	None reported	No remarks				
	Ward-Burton, model 1870	20	do	do				
June July	Remington, model 1870	20	do	Difficult to extract the shells			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Ward-Burton, model 1870	20	do	The locking-bolt becomes loose in going through the manual.				
Sept	Remington, model 1870	20	do	Difficult to extract shells			Springfield	
	Springfield, model 1870	20	3 firing-pins	No remarks				
	Ward-Burton, model 1870	20	None reported	The locking-bolt becomes loose in going through the manual.				

Nov ...	Remington, model 1870..	20	1 rear-sight	Difficult to extract shells			Springfield..
	Springfield, model 1870..	20	None reported	No remarks			
	Ward-Burton, model 1870	20	do	The locking-bolt becomes loose in going through the manual.			
Dec....	Remington, model 1870..	20	do	Difficult to extract shells			Springfield..
	Springfield, model 1870..	20	do	No remarks			
	Ward-Burton, model 1870	20	do	The locking-bolt becomes loose in going through the manual.			
1873. Jan	Remington, model 1870..	20	do	No remarks			Springfield..
	Springfield, model 1870..	20	do	do			
	Ward-Burton, model 1870	20	do	do			

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 firing-pin spring, 1 ejector-spring, 1 stock, 1 firing-pin, 1 extractor, 2 rear-sights		
Springfield, model 1870	20	3 firing-pins		
Sharps, model 1870	20	2 firing-pins, 1 stock		
Ward-Burton, model 1870	20	None reported		

Company K, Eighteenth Infantry, Captain James Stewart commanding; Sharps rifle-muskets issued April 13, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1873. March ..	Springfield, model 1870..	40	None reported	No remarks			Springfield...	
	Sharps, model 1870	20	do	do				

Company D, Twenty-third Infantry, Captain T. M. K. Smith commanding; Remington, Springfield, and Sharps rifle-muskets issued June 2, 1871; *Ward-Burton rifle-muskets issued June* 7, 1872.

1871. July ...	Remington, model 1870 .	20	None reported	No remarks			
	Springfield, model 1870..	20	do	do			
	Sharps, model 1870	20	do	do			

Company D, Twenty-third Infantry, Captain T. M. K. Smith commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Sept...	Remington, model 1870..	20	None reported	To load at half cock			Springfield...	
	Springfield, model 1870..	20	do	No remarks				
	Sharps, model 1870	20	do	Gun-sling in the way				
Dec....	Remington, model 1870..	20	do	No remarks				
	Springfield, model 1870..	90	do	do				
	Sharps, model 1870	20	do	do				
1872.								
April..	Remington, model 1870..	20	1 ejector-spring, 3 rear-sights	To load at half-cock; more powerful ejector	206	4	Springfield...	
	Springfield, model 1870..	20	None reported	No remarks	214	3		
	Sharps, model 1870	20	do	More powerful ejector	12			
May...	Remington, model 1870..	20	do	No remarks	27		Springfield...	
	Springfield, model 1870..	20	do	do	12			
	Sharps, model 1870	20	do	do	3			
June...	Remington, model 1870..	20	do	do			Springfield...	
	Springfield, model 1870..	20	do	do				
	Sharps, model 1870	20	do	do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 ejector-spring, 3 rear-sights	233	4
Springfield, model 1870	20	None reported	226	3
Sharps, model 1870	20	do	15	

Company E, Twenty-third Infantry, Captain George K. Brady commanding; Remington, Springfield, and Sharps rifle-muskets issued June 2, 1871; Ward-Burton rifle-muskets issued June 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
July	Remington, model 1870	20	None reported	To load at half-cock			Springfield	The screws of all the arms are made of poor material.
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	do				
Aug	Remington, model 1870	20	do	Does not eject shells	66	8	Springfield	
	Springfield, model 1870	20	do	No remarks	60	7		
	Sharps, model 1870	20	do	do	99	9		
Sept	Remington, model 1870	20	do	Does not eject shells	57	5	Springfield	
	Springfield, model 1870	20	do	No remarks	42	2		
	Sharps, model 1870	20	do	do	44	4		
Oct	Remington, model 1870	20	do	Does not eject shells	27	2	Springfield	
	Springfield, model 1870	20	do	No remarks	36	2		
	Sharps, model 1870	20	do	do	30	3		
Nov	Remington, model 1870	20	do	Does not eject shells	24	1	Springfield	
	Springfield, model 1870	20	do	No remarks	45	7		
	Sharps, model 1870	20	do	Too clumsy for troops to handle	48	3		
Dec	Remington, model 1870	20	do	Does not eject shells			Springfield	
	Springfield, model 1870	20	do	No remarks				
	Sharps, model 1870	20	do	Too clumsy for troops to handle				
1872.								
Jan	Remington, model 1870	20	1 barrel, 1 stock damaged	Does not eject shells			Springfield	
	Springfield, model 1870	20	None reported	No remarks				
	Sharps, model 1870	20	1 lever	Too clumsy for troops to handle				
Feb	Remington, model 1870	20	None reported	Does not eject shells	30	2	Springfield	
	Springfield, model 1870	20	do	No remarks	36	4		
	Sharps, model 1870	20	do	Too clumsy for troops to handle	33	3		
March	Remington, model 1870	20	1 broken accidentally by team	No remarks			Springfield	
	Springfield, model 1870	20	None reported	do				
	Sharps, model 1870	20	do	do				
April	Remington, model 1870	20	do	do			Springfield	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	19	do	do				
May	Remington, model 1870	20	do	do			Springfield	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	18	do	do				
June	Remington, model 1870	20	do	do			Springfield	
	Springfield, model 1870	20	do	do				
	Sharps, model 1870	18	1 lever	do				
Dec	Ward-Burton, model 1870	20	None reported	do	130	20		Lieut. R. H. Poillon commanding.

Company E, Twenty-third Infantry, Captain George K. Brady commanding—Continued.

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 barrel, 1 stock	204	18
Springfield, model 1870	20	None reported	219	22
Sharps, model 1870	20	2 levers	254	22
Ward-Burton, model 1870	20	None reported		

Company I, Twenty-third Infantry, Captain George M. Randall commanding; Remington, Springfield, and Sharps rifle-muskets issued June 2, 1871; Ward-Burton rifle-muskets issued June 7, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
June	Remington, model 1870	20	None reported	No remarks	61	8		
	Springfield, model 1870	20	do	do	61	8		
	Ward-Burton, model 1870	20	do	do	61	4		
Sept	Remington, model 1870	20	do	do	168	7		
	Springfield, model 1870	20	1 stock	do	166	7		
	Ward-Burton, model 1870	20	do	do	166	4		
Dec	Remington, model 1870	20	None reported	do				
	Springfield, model 1870	19	1 stock	do				
	Ward-Burton, model 1870	19	do	do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	None reported	229	15
Springfield, model 1870	20	2 stocks	227	15
Ward-Burton, model 1870	20	do	227	8

Compa y E, Twenty-fourth Infantry, Captain J. W. Clous commanding; Remington, Springfield, and Sharps rifle-muskets issued July 17, 1871; Ward-Burton rifle-muskets issued May 1, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Aug ...	Remington, model 1870..	20	1 rear-sight, 1 rear-sight slide....	No remarks	10		Springfield.	
	Springfield, model 1870..	20	None reported	do	10			
	Sharps, model 1870	20	3 levers	The swivel to be removed above the lever.	15			
Sept ...	Remington, model 1870..	20	None reported	No remarks			Springfield.	
	Springfield, model 1870..	20	do	do	177			
	Sharps, model 1870	20	do	do				
Dec....	Remington, model 1870..	20	1 stock	do	70	7	Springfield.	
	Springfield, model 1870..	20	None reported	do	60	3		
	Sharps, model 1870	20	do	do	80	13		
1872.								
Jan....	Remington, model 1870..	20	do	do				Lieutenant J. L. Bullis commanding.
	Springfield, model 1870..	20	do	do				
	Sharps, model 1870	20	do	do				
Feb....	Remington, model 1870..	20	do	do			Springfield...	
	Springfield, model 1870..	20	do	do				
	Sharps, model 1870	18	do	do				
March .	Remington, model 1870..	20	1 rear-sight, 1 rear-sight slide, 1 extractor.	do	77	14	Springfield..	
	Springfield, model 1870..	20	1 rear-sight leaf-slide	do	70	2		
	Sharps, model 1870	18	2 rear-sights lost	do	70	8		

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 stock, 2 rear-sights, 2 rear-sight slides, 1 extractor	157	18
Springfield, model 1870	20	1 rear-sight slide	217	5
Sharps, model 1870	20	3 levers	165	21

Company A, Twenty-fifth Infantry, Captain John W. French commanding; Remington, Springfield, and Sharps rifle-muskets issued July 17, 1871; Ward-Burton rifle-muskets issued May 1, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Sept...	Remington, model 1870..	20	None reported	No remarks	100		Springfield...	Lieut. A. Geddes commanding.
	Springfield, model 1870..	20	2 rear-sight leaves	do	100			
	Sharps, model 1870	20	None reported	Gun-swivel in the way	100			
Dec....	Remington, model 1870..	19	1 rear-sight leaf	Too complicated; heavy and less convenient than Springfield.	300	2	Springfield...	Lieut. A. Geddes commanding.
	Springfield, model 1870..	19	do	No remarks				
	Sharps, model 1870	19	None reported	The cartridge has to be forced home with the thumb.				
1872.								
Feb....	Remington, model 1870..	20	1 stock	Too complicated; heavy and less convenient than Springfield.			Springfield...	
	Springfield, model 1870..	20	1 rear-sight	No remarks				
	Sharps, model 1870	20	1 bridle	The cartridge has to be forced home with the thumb.				
March .	Remington, model 1870..	20	None reported	No remarks	650	1	Springfield...	Cartridges fail in Sharps which go in Springfield.
	Springfield, model 1870..	19	do	do				
	Sharps, model 1870	20	do	do				
April ..	Remington, model 1870..	19	do	do			Springfield...	
	Springfield, model 1870..	18	do	do				
	Sharps, model 1870	19	1 lever	do				
May ...	Remington, model 1870..	19	None reported	do			Springfield...	
	Springfield, model 1870..	19	do	do				
	Sharps, model 1870	18	1 lever	do				
	Ward-Burton, model 1870	19	None reported	do				
June...	Remington, model 1870..	19	do	do	100		Springfield...	
	Springfield, model 1870..	17	do	Prefers Springfield over Remington and Sharps for strength of stock, rapidity of fire, ejection of shells, and ability to stand rough usage; over Ward-Burton for strength of breech-loading parts and safety.				
	Sharps, model 1870	20	do	No remarks				
	Ward-Burton, model 1870	19	do	do				
July ...	Remington, model 1870..	18	do	do	50		Springfield...	
	Springfield, model 1870..	17	do	do				
	Sharps, model 1870	19	do	do				
Sept...	Remington, model 1870..	18	do	do	52		Springfield...	
	Springfield, model 1870..	17	do	do				
	Sharps, model 1860	3	do	do				
	Ward-Burton, model 1870	19	do	do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	1 stock, 1 rear-sight leaf	400	2
Springfield, model 1870	20	1 rear-sight, 3 rear-sight leaves	100	.....
Sharps, model 1870	20	1 bridle, 2 levers	100	.....
Ward-Burton, model 1870	20	None reported	.....	.....

Company G, Twenty-fifth Infantry, Captain J. H. Patterson commanding; Remington, Springfield, and Sharps rifle-muskets issued July 17, 1871; Ward-Burton rifle-muskets issued May 1, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Oct	Remington, model 1870	20	None reported	No remarks	.....	.....	Springfield	
	Springfield, model 1870	20	do	do	.....	.....		
	Sharps, model 1870	20	do	do	.....	.....		
Nov	Remington, model 1870	20	1 rear-sight	To load at half-cock	80	6	Springfield	
	Springfield, model 1870	20	None reported	No remarks	80	3		
	Sharps, model 1870	20	1 tumbler	Gun-sling in the way	80	6		
Dec	Remington, model 1870	20	None reported	Dangerous in two-rank formations	150	6	Springfield	
	Springfield, model 1870	20	do	No remarks	150	1		
	Sharps, model 1870	20	do	Fails to eject the shells	150	10		
1872.								
Jan	Remington, model 1870	20	do	The sights of all arms should have a friction-spring or set-screw.	175	.....	Springfield	
	Springfield, model 1870	20	do		200	.....		
	Sharps, model 1870	20	do		167	3		
Feb	Remington, model 1870	20	1 rear-sight	do	225	8	Springfield	
	Springfield, model 1870	20	1 stock		242	8		
	Sharps, model 1870	20	do		249	12		
March	Remington, model 1870	20	None reported	No remarks	630	14	Springfield	
	Springfield, model 1870	20	do	do	767	15		
	Sharps, model 1870	20	do	do	727	31		
April	Remington, model 1870	20	do	do	19	.....	Springfield	
	Springfield, model 1870	20	do	do	17	.....		
	Sharps, model 1870	20	do	do	20	2		
May	Remington, model 1870	20	do	do	130	2	Springfield	
	Springfield, model 1870	20	do	do	140	3		
	Sharps, model 1870	20	do	do	138	6		

Company G, Twenty-fifth Infantry, Captain J. H. Patterson commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1872.								
June	Remington, model 1870	20	None reported	No remarks	21	2	Springfield	
	Springfield, model 1870	20	do	do	27			
	Sharps, model 1870	20	do	do	19	3		
	Ward-Burton, model 1870	20	do	do				
July	Remington, model 1870	20	do	do	135	5	Springfield	
	Springfield, model 1870	20	do	do	198	7		
	Ward-Burton, model 1870	20	do	do	120	6		
Aug	Remington, model 1870	19	do	do			Springfield	
	Springfield, model 1870	19	do	do				
	Ward-Burton, model 1870	19	do	do				
Sept	Remington, model 1870	20	1 stock, 1 side-screw	The sights of all arms should have a friction-spring or set-screw.	206	9	Springfield	
	Springfield, model 1870	20	1 rear-sight leaf		195	6		
	Ward-Burton, model 1870	19	None reported		275	11		
Oct	Remington, model 1870	18	1 side-screw, 4 rear-sight leaves	No remarks			Springfield	
	Springfield, model 1870	19	1 rear-sight	do				
	Ward-Burton, model 1870	18	None reported	do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	4 rear-sight leaves, 1 stock, 2 side-screws, 2 rear-sights	1,771	52
Springfield, model 1870	20	1 stock, 1 rear-sight leaf, 1 rear-sight	2,016	43
Sharps, model 1870	20	1 stock, 1 tumbler	1,550	73
Ward-Burton, model 1870	20	None reported	395	17

Company I, Twenty-fifth Infantry, Captain Gaines Lawson commanding; Remington, Springfield, and Sharps rifle-muskets issued July 17, 1871; Ward Burton rifle-muskets issued May 1, 1872.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1871.								
Aug	Remington, model 1870	20	None reported	No remarks	7		Springfield	
	Springfield, model 1870	20	do	do	7			
	Sharps, model 1870	20	do	do	7			
Sept	Remington, model 1870	20	do	do	340		Springfield	
	Springfield, model 1870	20	do	do	340			
	Sharps, model 1870	20	do	do	340	1		
Oct	Remington, model 1870	20	do	do	225		Springfield	
	Springfield, model 1870	20	do	do	225			
	Sharps, model 1870	20	do	do	225			
Nov	Remington, model 1870	20	do	do	116		Springfield	
	Springfield, model 1870	19	do	do	116			
	Sharps, model 1870	20	do	do	116			
Dec	Remington, model 1870	20	do	do	23		Springfield	
	Springfield, model 1870	19	do	do	23			
	Sharps, model 1870	19	1 lever	do	19			
1872.								
Jan	Remington, model 1870	20	1 stock	do	10		Springfield	
	Springfield, model 1870	19	None reported	do	10			
	Sharps, model 1870	20	do	do	10			
Feb	Remington, model 1870	20	do	do	50		Springfield	
	Springfield, model 1870	18	do	do	50			
	Sharps, model 1870	20	1 lever	do	50			
March	Remington, model 1870	20	None reported	do			Springfield	
	Springfield, model 1870	18	do	do				
	Sharps, model 1870	20	do	do				
April, May	Remington, model 1870	20	do	do			Springfield	
	Springfield, model 1870	17	do	do				
	Sharps, model 1870	20	do	do				
June	Remington, model 1870	19	do	do			Springfield	
	Springfield, model 1870	17	do	do				
	Ward-Burton, model 1870	18	do	do				
July, Aug, Sept	Remington, model 1870	18	do	do			Springfield	
	Springfield, model 1870	17	do	do				
	Ward-Burton, model 1870	18	do	do				
Oct, Nov	Remington, model 1870	17	2 stocks	do			Springfield	
	Springfield, model 1870	17	None reported	do				
	Ward-Burton, model 1870	18	do	do				
Dec	Remington, model 1870	18	do	do	60		Springfield	
	Springfield, model 1870	18	do	do	100			
	Ward-Burton, model 1870	18	do	do	40			

Company I, Twenty-fifth Infantry, Captain Gaines Lawson commanding—Continued.

Date of report.	Kind of arms.	On hand.	Broken parts.	Modifications and improvements suggested.	Cartridges fired.	Cartridges failed.	Preference.	Remarks.
1873.								
Jan	Remington, model 1870	18	None reported	No remarks			Springfield	
	Springfield, model 1870	18	do	do				
	Ward-Burton, model 1870	18	do	do				
Feb	Remington, model 1870	17	do	do			Springfield	
	Springfield, model 1870	18	do	do				
	Ward-Burton, model 1870	18	do	do				

TOTALS.

Kind of arms.	Originally issued.	Broken parts belonging to the system.	Cartridges fired.	Cartridges failed.
Remington, model 1870	20	3 stocks	831	
Springfield, model 1870	20	None reported	871	
Sharps, model 1870	20	2 levers	767	1
Ward-Burton, model 1870	20	None reported	40	

A J.—SUB-ABSTRACT OF PREFERENCES.

Expression of the preferences of officers having the experimental arms for comparative trial.

		1871.								1872.												1873.		
Regiment.	Company.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.
2d artillery	D			Sp	Sp	Sp	Sp.	Sp	Sp	Sp														
	F																							
	G				Sp																			
	H			R	R	R						Sp												
	M											Sp	Sp	Sp										
3d artillery	E																	Sp.						
	H																Sp	Sp.						
	K			Sp	Sp.							Sp	Sp											
Total Springfield, 11.																								
1st cavalry	A					Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp		Sp	Sp	Sp	Sp		
	I															Sp	Sp		Sp	Sp	Sp			
2d cavalry	B																							
	I				R½	R½	R½	R½	R½		R½	R½	R½		R½	R½		R½	Sp.	Sp		R½		
	E								Ships.			Ships.	Ships.	Ships.	Sp.	Sp.	Sp.	Sp	Sp	Sp.	Sp.	Sp.	Sp.	
	I																							
3d cavalry	C																							
	D														Ships	Sp	Sp	Sp						
	F																							
	I														Ships & Sp	Ships & Sp	Ships & Sp	Ships & Sp	Ships	Sp	Sp	Sp		
	L																							
	M																							
4th cavalry	K					Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp									
5th cavalry	A																		Sp	Sp				
	K																							
6th cavalry	D																	Sp						
	G																							
	H																							
	I																							
7th cavalry	I																							
	K																							
9th cavalry	D																							
	I									Sp		Sp	Sp			Sp	Sp	Sp		Sp	Sp	Sp	Sp	
Total Springfield, 12; Remington, 1; Sharps, [illegible].																								
3d infantry	C		R	R	R	R	R	R	R	R	R	R	R	R & Sp	R	R & Sp	R & Sp	R & Sp.	R & Sp	R & Sp	R & Sp			
	H			Sp	Sp	Sp	Sp.	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp.	Sp	Sp	Sp	Sp	Sp	
	G		Sp	Sp	Sp R.	Sp R	Sp R	Sp	Sp R	Sp		Sp			Sp		R							
4th infantry	C							R		R	R					R			R					
5th infantry	B							Sp	Sp	Sp.	Sp	Sp	Sp	Sp	Sp.	Sp	Sp	Sp	Sp	Sp				
	I			Sp	Sp	Sp.	Sp	Sp	Sp	Sp		Sp	Sp	Sp	Sp	Sp	Sp	Sp						
	H					Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	
	G		Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp		Sp	Sp.	Sp	Sp	Sp	
	K	Sp	Sp		Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp			Sp		Sp		Sp.	Sp	Sp
6th infantry	L																							
	I							R	R			R			R		R							
	G			Sp	Sp	Sp			Sp						Sp									
9th infantry	B	Sp	Sp	Sp	Sp			Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	
	C																					Sp		
	D																	Sp			Sp			
	E			Sp	Sp	Sp	Sp																	
	G					Sp		Sp			Sp	Sp		Sp	Sp			Sp				Sp		
10th infantry	A				Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp Sp	Sp Sp	Sp Sp	Sp Sp	
	B					Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp		Sp					
	C					Sp		Sp	Sp	Sp												Sp		
11th infantry	A					Sp	Sp	Sp Sp	Sp	Sp Sp	Sp	Sp	Sp	Sp	Sp Sp	Sp	Sp	Sp	Sp	Sp				
	B												Sp	Sp		Sp	Sp	Sp	Sp	Sp Sp	Sp Sp	Sp	Sp	
	D												Sp	Sp	Sp	Sp	Sp	Sp Sp	Sp			Sp		
	H																							
12th infantry	A																			R.				
	F																							
	B								Sp	Sp	Sp	Sp	R.											
	I		Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp		Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp		
	K			Sp	I	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp			Sp			
13th infantry	A	Sp		Sp	Sp	Sp	Sp.	Sp	Sp	Sp	Sp	Sp	Sp		Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp.	Sp	
	C			Sp	Sp			Sp	Sp		Sp		Sp & W. B.		Sp		Sp	Sp	Sp	Sp	Sp		Sp	
	I		Sp	R & Sp	Sp	Sp	Sp		Sp	Sp	Sp		Sp	Sp	Sp	Sp		Sp	Sp	Sp	Sp	Sp	Sp. Sp	
	G	Sp	Sp	Sp				Sp		Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp Sp	
14th infantry	A																	Sp						
	F																	Sp						
	I							Sp	Sp		Sp		Sp	Sp	Sp						Sp	Sp	Sp	
	G		I	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp.	Sp	Sp
	H																							
	K	R	L	R	L Sp	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
15th infantry	C					L.	Sp.	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	R								
	D			Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp									
16th infantry	F					Ships	Ships	Ships.	Ships	Ships		Sp	Sp	Sp.	Sp	Sp								
1st infantry	A		Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp		Sp
	E	Sp	Sp			Sp	Sp.	Sp.	Sp		Sp	Sp	Sp	Sp	Sp	Sp								
	K																							
22d infantry	D					Sp.							Sp	Sp	Sp									
	F			Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp.	Sp	Sp	Sp									
	I																							
24th infantry					Sp	Sp Sp			Sp Sp		Sp	Sp												
25th infantry	A										Sp	Sp	Sp	Sp	Sp	Sp		Sp						
	C						Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp.	Sp	Sp.	Sp				
					Sp	Sp	Sp.	Sp	Sp	Sp	Sp.	Sp	Sp	Sp	Sp	Sp	Sp	Sp.	Sp.					
Total Springfield, 61; Remington, 9.																								

R. [illegible] Remington.
R. [illegible] the Remington [illegible]

Sp. indicates a preference for the Springfield.
Sh. indicates a preference for the Sharps.

W. B. indicates a preference for the Ward-Burton.
When two or more arms are equally esteemed, they are all named as preferred.

NOTE.—The marks refer to the last opinions given.

(B.)—SUB

Regiment.	Company.	No. of arms.	N re
First Cavalry	A	25	
	I	28	
Second Cavalry	C	28	
	E	27	
Third Cavalry	D	7	
	F	7	
Fourth Cavalry	K	28	
Fifth Cavalry	A	11	
Sixth Cavalry	D	22	
Seventh Cavalry	F	21	
	K	28	
Ninth Cavalry	L	27	
Second Artillery	D	20	
	F	19	
	G	20	
	H	20	
	M	20	
Third Artillery	E	40	
	H	19	
	K	19	
Fourth Artillery	G	14	
	K	40	
Fifth Artillery	E	70	
Third Infantry	C	20	
	G	11	
	H	20	
	K	50	
Fourth Infantry	C	20	
Fifth Infantry	B	20	
	F	20	
	G	18	
	H	18	
	K	20	
Sixth Infantry	B	18	
	F	18	
	G	20	
Ninth Infantry	B	20	

(B.)—SUB-ABSTRACT OF PRINCIPAL BROKEN PARTS AND OF PROPORTIONATE MISSFIRES FROM THE DIFFERENT SYSTEMS.

REMINGTON.

Regiment.	Company.	No. of arms.	No. of reports.	Principal parts broken. Stocks.	Receivers.	Breech-blocks.	Main-springs.	Extractors.	Cartridges fired.	Cartridges failed.
First Cavalry	A	29	16	4			1		2,500	48
	I	24	5	2			3		370	0
Second Cavalry	C	28	17	7					2,470	111
	E	28	13	1			3		48	0
Third Cavalry	F	7	8						870	75
Fourth Cavalry	K	28	10						1,895	86
Fifth Cavalry	A	7	2						147	5
Sixth Cavalry	D	20	1						120	10
Seventh Cavalry	F	21	1						125	6
	K	28	1						50	3
Ninth Cavalry	L	27	15	4				1	1,633	56
Second Artillery	D	20	8						661	21*
	F	19	7						0	0
	G	19	1						30	2
	H	20	4						248	6
	M	19	9						276	3
Third Artillery	H	19	3				2		478	13
	K	19	14					1	2,503	8
Fourth Artillery	G	19	1						0	0
	K	20	1						50	0
Third Infantry	C	20	21				1	1	8,450	19
	G	16	10						1,996	0
	H	20	12				2		2,873	26
Fourth Infantry	C	20	18						200	0
Fifth Infantry	B	20	14						1,240	16
	F	20	14	2					0	0
	G	18	21					1	1,213	0
	H	18	21						2,368	19
	I	20	1						0	0
	K	20	18						576	7
Sixth Infantry	B	18	19	1					681	0
	F	18	9	1					687	28
	G	20	5						841	32
Eighth Infantry	A	58	4						1,200	55
	I	58	3	1					1,421	125
Ninth Infantry	B	20	19						4,400	55
	C	20	11						300	0
	E	20	5						508	85
	G	20	8						2,025	25
Tenth Infantry	A	20	19	1					230	10
	B	20	17	3			1	1	1,482	22
	C	18	6						1,083	11
Eleventh Infantry	A	20	18				1		781	13
	B	20	15	6					2,943	192
	D	20	11				1		3,353	649
Twelfth Infantry	E	20	18						1,414	8
	H	20	7						630	53
	I	20	20						536	14
	K	20	20						1,683	20
Thirteenth Infantry	A	20	21				3		2,922	39
	C	20	16						2,935	22
	E	20	18				1		2,289	16
	G	20	19				4		1,801	20
Fourteenth Infantry	A	20	17						2,968	22
	E	20	10	1					1,520	8
	G	20	21			1	1		1,944	160
	K	20	22						8,217	132
Fifteenth Infantry	C	19	12						802	103
	D	20	12						260	21
Sixteenth Infantry	B	20	13				2		655	1
Eighteenth Infantry	A	20	15				1		290	5
	E	20	17	1				1	0	0
Twenty-third Infantry	D	20	6						233	4
	E	20	13	1					294	18
	I	20	3						229	15
Twenty-fourth Infantry	E	20	6	1				1	157	18
Twenty fifth Infantry	A	20	9	1					400	2
	G	20	13	1					1,771	52
	I	20	19	3					831	0
Total		1,502	810	42		1	30	7	89,828	*2,595
Parts broken per 1,000 reports by 1,502 guns				52		1.23	37	9		
Parts broken per 1,000 guns per 1,000 reports				35		0.82	25	6		

*2.88 per cent.

-ABSTRACT—Continued.

PRINGFIELD.

o. of ›orts.	Principal parts broken.					Cartridges fired.	Cartridges failed.
	Stocks.	Receivers.	Breech-blocks.	Main-springs.	Extractors.		
16	3			1		2,100	47
5						370	0
17	3					1,340	78
13	3			3		48	0
3						225	19
8						900	25
10	9		1			1,915	65
2						321	3
1						120	5
1						125	7
1						50	1
15	3					1,732	19
8						661	25
7						0	0
1						40	0
4						271	3
9						225	0
1						177	13
3						538	6
14						2,281	16
1						0	0
1						60	0
1						0	0
21						7,524	25
10						3,916	0
19				1		2,803	0
1						0	0
18						0	0
14					1	1,726	14
14						0	0
21						1,115	0
21						3,186	34
18						729	1
19						669	0
9						616	39
5						876	30
19						4,515	34

(B.)—SU

Regiment.	Company.	No. of arms.	No. of reports.
First Cavalry	A	18	2
Second Cavalry	C	21	7
	E	21	9
Third Cavalry	D	7	4
	F	7	8
Sixth Cavalry	D	18	1
	L	18	2
Seventh Cavalry	F	21	1
Ninth Cavalry	L	20	7
Second Artillery	M	20	4
Third Artillery	H	19	3
	K	19	3
Fourth Artillery	G	18	1
	K	20	1
Third Infantry	C	20	11
	H	20	10
Fourth Infantry	C	20	8
Fifth Infantry	B	20	9
	F	20	6
	G	18	12
	H	18	12
	K	20	9
Sixth Infantry	F	18	3
	G	20	1
Ninth Infantry	B	20	11
	C	19	2
	E	20	2
	G	20	5
Tenth Infantry	A	20	9
	B	20	8
	C	19	1
Eleventh Infantry	A	20	9
	B	20	7
	D	20	6
Twelfth Infantry	E	20	5
	I	20	8
	K	20	7

(B.—SUB-ABSTRACT—Continued.

SPRINGFIELD.

Regiment.	Company.	No. of arms.	No. of reports.	Principal parts broken. Stocks.	Receivers.	Breech-blocks.	Main-springs.	Extractors.	Cartridges fired.	Cartridges failed.
First Cavalry	A	25	16	3			1		2,100	17
	I	28	5						370	0
Second Cavalry	C	28	17	3					1,340	78
	E	27	13	3			3		18	0
Third Cavalry	D	7	3						225	19
	F	7	8						900	25
Fourth Cavalry	K	28	10	9		1			1,915	65
Fifth Cavalry	A	11	2						321	3
Sixth Cavalry	D	22	1						120	5
Seventh Cavalry	F	27	1						125	7
	K	28	1						50	1
Ninth Cavalry	L	27	15	3					1,732	19
Second Artillery	D	20	8						661	25
	F	19	7						0	0
	G	20	1						10	0
	H	20	4						271	3
	M	20	9						225	0
Third Artillery	E	40	1						177	13
	H	19	3						358	6
	K	19	11						2,281	16
Fourth Artillery	G	14	1						0	0
	K	40	1						60	0
Fifth Artillery	E	70	1						0	0
Third Infantry	C	20	21						7,521	25
	G	11	10						3,916	0
	H	20	19				1		2,803	0
	K	50	1						0	0
Fourth Infantry	C	20	18						0	0
Fifth Infantry	B	20	11					1	1,726	11
	F	20	14						0	0
	G	18	21						1,115	0
	H	18	21						3,186	31
	K	20	18						729	1
Sixth Infantry	B	18	19						669	0
	F	18	9						616	39
	G	20	5						876	30
Ninth Infantry	B	20	19						1,545	31
	C	48	11						2,100	0
	E	20	5						731	30
	D	48	1						321	0
	G	20	8						2,015	5
Tenth Infantry	A	20	19						310	8
	B	20	17						2,173	8
	C	18	6						1,075	3
Eleventh Infantry	A	20	18				1		1,111	21
	B	20	15	1					2,721	65
	D	20	11	1					3,176	681
	H	50	2						10	1
Twelfth Infantry	A	57	1						355	0
	E	20	18						1,502	1
	H	20	7						610	10
	I	20	20						698	9
	K	20	20						1,022	16
Thirteenth Infantry	A	20	21	2					3,133	3
	C	20	16						2,985	0
	E	20	18						2,162	12
	G	20	19						1,618	5
Fourteenth Infantry	A	20	17						5,168	6
	B	15	1						255	0
	E	20	10						1,810	5
	G	20	21	1					4,563	275
	H	55	1						130	0
	K	20	27				1		8,711	68
Fifteenth Infantry	C	16	12						733	32
	D	20	12						0	0
Sixteenth Infantry	B	20	13				2		657	5
Eighteenth Infantry	A	20	15						310	2
	I	20	17						0	0
	K	20	1						0	0
Twenty-third Infantry	D	20	5						226	3
	I	20	13						219	22
Twenty-fourth Infantry	I	20	3	2					227	13
Twenty-fifth Infantry	I	20	6						217	5
	K	20	1						100	0
	G	20	13	1					2,016	13
	I	20	19						871	0
Total		1,828	811	32		1	9	1	96,179	*1,882
[illegible] per 1,000 inlisted men										
[illegible]				20		1 2/3	11	1 2/3		
[illegible] per 1,000 [illegible]										
[illegible]				21		0 6/7	6	0 6/7		

*1.9[illegible] per cent.

(B.)—SUB-ABSTRACT—Continued.

SHARPS.

Regiment.	Company.	No. of arms.	No. of reports.	Principal parts broken. Stocks.	Receivers.	Breech-blocks.	Main-springs.	Extractors.	Levers.	Cartridges fired.	Cartridges failed.
First Cavalry	A	* 25	16				1			1,800	35
	I	24	5							570	0
Second Cavalry	B	56	1	2						2,020	40
	C	28	17	2						1,175	83
	E	27	11	3			3			116	0
	I	14	1							630	53
Third Cavalry	C	78	1	1						2,000	0
	D	63	1							1,855	6
	E	89	1							657	10
	F	52	8							2,450	78
	L	73	1							560	20
	M	92	1							900	6
Fourth Cavalry	F	80	1							550	23
	H	73	1							520	50
	K	28	10							1,885	106
Fifth Cavalry	A	57	2							1,314	30
	K	76	1	2						6,150	250
Sixth Cavalry	D	20	1							120	5
	G	56	1							850	161
	H	81	1	1						3,000	223
Seventh Cavalry	F	24	1							125	1
	K	28	1							50	2
Ninth Cavalry	D	80	2	1						450	3
	L	27	15	1			4			1,737	53
Second Artillery	D	20	8							661	29
	F	19	7							0	0
	G	20	1							30	0
	H	19	3							213	1
	M	20	9						2	0	0
Third Artillery	E	19	1							125	2
	K	19	13							1,419	5
Third Infantry	C	20	21							8,300	50
	G	19	1							666	0
	H	20	19						2	1,903	15
Fourth Infantry	C	20	10							0	0
Fifth Infantry	B	20	6			1			1	860	20
	I	20	8	1						0	0
	G	18	9							744	2
	H	18	15						2	1,206	10
	K	20	10							176	9
Sixth Infantry	B	18	19	8						681	0
	F	18	8	1					2	566	27
	G	20	4	1						547	13
Ninth Infantry	B	20	8	1						1,585	17
	C	20	9	1						500	0
	E	20	3	1						66	0
	D	14	1							90	0
	G	20	3							1,025	6
Tenth Infantry	A	20	13							132	8
	B	20	9				1			1,480	32
	C	19	6							1,104	17
	D	16	1							0	0
Eleventh Infantry	A	20	10	1					1	136	1
	B	20	8							1,874	100
	D	20	9							2,073	643
	H	14	2							30	7
Twelfth Infantry	E	20	13							1,049	9
	H	20	7							630	61
	I	20	12							165	11
	K	20	14							868	13
Thirteenth Infantry	A	20	12							1,232	3
	C	20	7							710	15
	E	20	8							195	2
	G	20	7							312	3
	I	19	1							174	17
Fourteenth Infantry	A	20	8							1,000	0
	B	20	1							15	10
	E	20	1							60	0
	G	20	10							456	27
	H	18	1							140	0
	K	20	11							5,788	88
Fifteenth Infantry	C	18	12							880	111
	D	20	12							0	0
Sixteenth Infantry	B	20	9				1			482	1
Eighteenth Infantry	A	20	9		1		1	1		200	1
	E	20	9	1						0	0
	K	20	1							0	0
Twenty-third Infantry	D	20	6							15	0
	E	20	12						2	254	22
Twenty-fourth Infantry	E	20	6						3	165	21
Twenty-fifth Infantry	A	20	9						2	100	0
	G	20	9	1						1,550	17
	I	20	10						2	767	1
Total		2,470	584	30	1	1	11	1	19	76,628	*2,699
Parts broken per 1,000 reports by 2,470 guns				51	1.71	1.71	19	1.71	33		
Parts broken per 1,000 guns per 1,000 reports				21	0.69	0.69	8	0.69	13		

* 5.52 per cent.

-ABSTRACT—Continued.

ARD-BURTON.

Principal parts broken.						Cartridges fired.	Cartridges failed.
ocks.	Receivers.	Bolts.	Mainsprings.	Extractors.	Upper guard-screws.		
						200	0
9						455	9
						84	10
						425	37
						910	53
					2	120	5
						400	100
						125	6
						885	37
						113	6
2						538	20
						1,135	5
						0	0
						50	4
					1	6,120	12
		5			5	1,090	5
						0	0
						640	11
						0	0
		1	1			300	0
		1				1,170	12
						217	1
						0	0
		1				265	12
1		2				3,780	54
						0	0
						400	80
		1				1,400	6
4						180	12
		1	3	2	1	783	65
						0	0
			1		1	525	20
						850	95
						1,329	76
					2	477	7
						42	10
						503	4
						1,022	9

(C.)—RECAPITULATION.

		Remington.	Springfield.	Sharps.	Ward-Burton.
Number of arms originally issued and reported on		1,502	1,828	2,470	1,039
Number of monthly reports rendered		810	814	584	334
Last expression of preference by officers commanding companies		10	84	1	0
Proportionate number of principal parts broken, as by 1,000 guns in 1,000 months.	Stocks	35.0	21.0	21.0	58.0
	Receivers	0.0	0.0	0.69	0.0
	Blocks or bolts	0.82	0.67	0.69	49.0
	Mainsprings	25.0	6.0	8.0	14.0
	Extractors	6.0	0.67	0.69	6.0
	Levers	.....	.....	13.0	.....
	Upper guard-screws	.....	.....	.....	35.0
	Total	66.82	28.34	44.07	162.0
Number of cartridges fired		89,828	96,479	76,628	40,070
Number of cartridges failed		2,595	1,882	2,699	970
Percentage of misfires		0.0288	0.0196	0.0352	0.0242

(B.)—SUB-ABSTRACT—Continued.

WARD-BURTON.

Regiment.	Company.	No. of arms.	No. of reports.	Principal parts broken. Stocks.	Receivers.	Bolts.	Mainsprings.	Extractors.	Upper guard-screws.	Cartridges fired.	Cartridges failed.
First Cavalry	A	18	2							200	0
Second Cavalry	C	21	7	9						455	9
	E	21	9							84	10
Third Cavalry	D	7	4							425	37
	F	7	8							910	53
Sixth Cavalry	D	18	1						2	120	5
	L	18	2							400	100
Seventh Cavalry	F	21	1							125	6
Ninth Cavalry	L	20	7							885	37
Second Artillery	M	20	4							113	6
Third Artillery	H	19	3	2						538	20
	K	19	3							1,135	5
Fourth Artillery	G	18	1							0	0
	K	20	1							50	4
Third Infantry	C	20	11						1	6,120	12
	H	20	10			5			5	1,090	5
Fourth Infantry	C	20	8							0	0
Fifth Infantry	B	20	9							640	11
	F	20	6							0	0
	G	18	12			1	1			300	0
	H	18	12			1				1,170	12
	K	20	9							217	1
Sixth Infantry	F	18	3							0	0
	G	20	1			1				265	12
Ninth Infantry	B	20	11	1		2				3,780	54
	C	19	2							0	0
	E	20	2							400	80
	G	20	5			1				1,400	6
Tenth Infantry	A	20	9	4						180	12
	B	20	8			1	3	2	1	783	65
	C	19	1							0	0
Eleventh Infantry	A	20	9				1		1	525	20
	B	20	7							850	95
	D	20	6							1,329	76
Twelfth Infantry	E	20	5						2	477	7
	I	20	8							42	10
	K	20	7							503	4
Thirteenth Infantry	A	20	9							1,922	9
	C	20	9							1,500	0
	E	20	10			3				1,376	10
	G	20	11			1				1,507	4
Fourteenth Infantry	A	20	9							1,968	0
	E	20	6							1,150	9
	G	20	12	2						1,146	104
	K	20	12							2,700	28
Fifteenth Infantry	D	20	2							0	0
Sixteenth Infantry	B	20	4							460	1
Eighteenth Infantry	A	20	6			1				168	6
	E	20	9							0	0
Twenty-third Infantry	E	20	1							0	0
	I	20	3	2						227	8
Twenty-fifth Infantry	A	20	3							0	0
	G	20	5							395	17
	I	20	9							40	0
Total		1,039	334	20		17	5	2	12	40,070	*970
Parts broken per 1,000 reports by 1,039 guns				60		51	15	6	36		
Parts broken per 1,000 guns per 1,000 reports				58		49	14	6	35		

* 2.42 per cent.

IV.

APPENDIX

GIVING A

DESCRIPTION OF EACH OF THE INVENTIONS SUBMITTED TO THE BOARD,

INTENDED

TO ACCOMPANY THE CLASSIFIED NOMENCLATURE OF PARTS AS SHOWN IN THE DETAILED ILLUSTRATIONS ACCOMPANYING;

PREPARED BY

Lieut. HENRY METCALFE, U. S. Ordnance Corps,

RECORDER OF THE BOARD.

APPENDIX.

The object in view during the writing of the following descriptions has been to present concisely the distinctive features of the different systems of breech-loading small-arms mentioned in the preceding report.

For this purpose no plan seemed more natural than to show the consecutive operations of the parts in the performance of their several functions, during the opening, closing, and locking of the breech, firing the charge, and removing the empty cartridge-shells. These are the objects for the accomplishment of which the systems are variously contrived, and with which alone they are concerned. Questions regarding the caliber, accuracy of fire, and mounting of small-arms, are irrelevant to those involved in these discussions, and belong to departments of research independent of those under consideration by the board. An account of the operation of loading, essentially alike in all breech-loaders, has been omitted; while the working of the parts in opening and closing, and the means employed to fire the charge, to lock the breech against the effect of the explosion, and to extract and eject the empty shell, have been discussed as fully as was consistent with the limits of the work.

In the legends accompanying the illustrations, which have been prepared so as to reduce as closely as possible the various systems of nomenclature to a common standard, the parts have been classed, not only to show those intrinsic to the system under consideration and those not peculiar to it or common to all small-arms, but the former class has been subdivided to exhibit incidentally certain differences of the constructions, affecting their economy of manufacture, facility of maintenance, and liability to accidents requiring repair.

It is generally conceded, for example, that where other parts are to be oined, a pin is often better than a screw, which, besides being expensive to make, requires a special appendage for its service, and when broken, badly marred, or rusted, is most troublesome to remove. Springs, also, as necessary adjuncts, are objectionable, being subject to unexpected breaking and failure; while it is thought by many a continuous stock stands service better than one which is divided into parts. The minor parts are those which, while not specially belonging to any one of the preceding subdivisions, are peculiar to the system, although not indispensable to the proper performance of its duties.

The number and character of the other principal metallic parts afford a pretty sure method of judging of the simplicity of the arm,

though the application of this and other similar rules requires frequent qualification, a wise experience often separating what might be made a single piece into several constituent parts, with a gain in economy, durability, and efficiency. While it also frequently happens that many of the components may be assembled in one separate integral portion of the arm, which is segregated from the rest for the proper and independent performance of its duties.

The descriptions have been arranged according to a classification of breech-loading small-arms founded on the motions of the principa parts employed to secure the advantages which this system of loading affords. When slight differences of construction occur, reference is made to that specimen of the class which is most widely known or most generally accessible. In all cases where doubt or discordance of opinion might arise, the manuscript has been submitted for verification to the exhibitors of the arm; studious care being had meanwhile to avoid reference to the merits or disadvantages of the systems discussed.

ATER.

Colt's; SCOTT; HE
E-CARBINE.
GEMUTH.
E-GUN; DREYSE'S
ERLIN; GREENE, N
SLYN-TOMES; MER
rill; BARNEKOV-G
ETSON; BURGESS;

me forgotten.

SNELL.

BROUGHTON, No.

RDAN-RUSSIAN; M
; WERDER; SMO
NI; WESTLEY-RIC

mes.
INGTON-LOCKING,
TER; WHITTEMOR
HTON, No. 18; RO

A CLASSIFICATION OF BREECH-LOADING SMALL-ARMS *founded on the motions of the principal part by which the breech is opened and closed.*

- BREECH-LOADING SMALL ARMS HAVE—
  - 1st, a **fixed chamber**, closed by—
    - 1st, a *movable barrel* which is—
      - 1st, sliding ..... GARDNER'S RIFLE-RATCH.
      - 2d, sliding and rotating ..... Gallagher.
      - 3d, rotating about an axis.
        - 1st, parallel to axis of barrel ..... All revolvers like Colt's; SCOLT; HELM.
        - 2d, at 90° to axis of barrel, and—
          - 1st, vertical, in plane of axis of barrel ..... PRUSSIAN NEEDLE CARBINE.
          - 2d, horizontal, beneath barrel ..... Maynard; WORLDSWORTH.
    - 2d, a *movable breech-block*, which is—
      - 1st, in line of axis of barrel by
        - 1st, direct action, *i. e., bolt gun*, having
          - 1st, concealed locks ..... PRUSSIAN NEEDLE GUN; DERINGER'S IMPROVED NEEDLE GUN; CHASSEPOT; WARD-BURTON; MAUSER; VETTERLIN; GREENE, No. 14; MILBANK, No. 51; LEE, No. 53.
          - 2d, outside locks ..... VAN CROAIE; JOSIAH TOMES; MERRILL, No. 83.
        - 2d, indirect action, *i. e.*, moved by levers, from—
          - 1st, above ..... Morse, No. 1; Merrill; BARNEBOY GREENE.
          - 2d, below ..... WINCHESTER; SELESON; BURGESS; A. C. BEALS, No. 19; RUMSEY.
      - 2d, at 90° to axis of barrel, and—
        - 1st, vertically ..... SHARPS.
        - 2d, horizontally ..... A French gun, name forgotten.
      - 2d, sliding and rotating ..... Ballard.
      - 3d, rotating about an axis.
        - 1st, parallel to axis of barrel, and—
          - 1st, above it ....
          - 2d, below it ..... WILENDL.
          - 3d, beside it, to the—
            - 1st, right ..... Snider; Werner; SNELL.
            - 2d, left ..... Joslyn; EARNIST.
        - 2d, at 90° to axis of barrel, and—
          - 1st, vertical, lying
            - 1st, in plane of axis of barrel ..... FRIEDMAN.
            - 2d, out of plane of axis of barrel, and in— (*All are to the right.*)
              - 1st, front ..... MILBANK, No. 50; BROCHRIDGE, No. 15.
              - 2d, rear ....
          - 2d, horizontal, lying
            - 1st, above axis of barrel, and in.
              - 1st, front ..... SPRINGFIELD; BERDAN RUSSIAN; MORGANSTERN; BROCHRIDGE, No. 79.
              - 2d, rear, moved from.
                - 1st, above ..... ROBERTS; ELLIOT; WEBBER; SMOOT; LEE, No. 54; LEE, No. 61.
                - 2d, below ..... PEABODY; MARTINI; WESTLEY-RICHARDS; CORDOV.
            - 2d, in plane of axis of barrel, and in
              - 1st, front ..... Beal.
              - 2d, middle ..... Allen & Wheelock.
              - 3d, rear ..... Morse, No. 2; Simmons.
            - 3d, below axis of barrel, and in.
              - 1st, front, moved from.
                - 1st, above, (*by a thumb piece*) ..... REMINGTON; REMINGTON-LOCKING, including THOMAS; REMINGTON RUDER; WHITNEY, Nos. 10 and 11; DENTER; WHITTEMORE; MUIR MOST STORM, No. 60; UPPERHAFF.
                - 2d, below, (*by a lever*) ..... SPENCER; BROCHRIDGE, No. 18; ROBERTSON; Starr's; EVANS; KIRK; G. R. REMINGTON.
              - 2d, rear .....
  - 2d, a **movable chamber.** (Double.) Burnside, Hall, SLEEPER, WORRELL.

The names in small capitals are those of types submitted to the Board.

N. B.—This list is an abstract of a much more extended one, embracing over one hundred names, from which only prominent examples have been selected, when the docket of the Board failed to present a suitable type for the illustration of the principle involved.

WEIGHTS OF THE PRINCIPAL SYSTEMS.

CLASS I, weighing 1 pound 13 ounces:
62. Snell.

CLASS II, weighing 1 pound 15 ounces:
26. Ward-Burton.
38. Dexter.

CLASS III, weighing 2 pounds 2 ounces:
15. Morgenstern.

CLASS IV, weighing 2 pounds 3 ounces:
40. Joslyn-Tomes.

CLASS V, weighing 2 pounds 4 ounces:
57. Russian-Berdan.
51. Milbank.
Mauser. German.
68. Springfield-Allin.

CLASS VI, weighing 2 pounds 5 ounces
Martini-Henry.
69. Springfield.
Werder. Bavarian.
66. Springfield-Stillman.

CLASS VII, weighing 2 pounds 6 ounces:
Chassepot.
99. Springfield.

CLASS VIII, weighing 2 pounds 7 ounces:
53. Lee.

CLASS IX, weighing 2 pounds 8 ounces:
79. Broughton.
63. Peabody.

CLASS X, weighing 2 pounds 9 ounces:
19. Remington.
48. Springfield.

CLASS XI, weighing 2 pounds 10 ounces:
32. Smoot.
41. Spanish-Remington.

CLASS XII, weighing 2 pounds 11 ounces:

10. Whitney.
22. Remington.
Werndl. Austrian.
61. Lee.
Dreyse, improved. German.
47. Remington-Schofield.

CLASS XIII, weighing 2 pounds 12 ounces:

44. Thomas.
21. Remington.
20. Remington.
18. Broughton.

CLASS XIV, weighing 2 pounds 13 ounces:

11. Whitney.
43. Remington-Ryder extractor.
Needle-gun. German.
54. Lee.

CLASS XV, weighing 2 pounds 14 ounces:

67. Remington-Ryder.
80. Elliot carbine.
97. Ward-Burton magazine.

CLASS XVI, weighing 2 pounds 15 ounces:

30. C. M. Spencer.

CLASS XVII, weighing 3 pounds:

5. Sharps.
45. Broughton.
34. Van Choate.

CLASS XVIII, weighing 3 pounds 1 ounce:

83. Merrill.

CLASS XIX, weighing 3 pounds 2 ounces:

42. Updegraff.

CLASS XX, weighing 3 pounds 3 ounces:

59. Freeman.

CLASS XXI, weighing 3 pounds 4 ounces:

79. A. T. Freeman.

CLASS XXII, weighing 3 pounds 5 ounces:

24. Elliot.
3. Scott magazine.

CLASS XXIII, weighing 3 pounds 6 ounces:

59. A. T. Freeman.

CLASS XXIV, weighing 3 pounds 15 ounces
Vetterlin. Swiss.

CLASS XXV, weighing 4 pounds:
Needle-carbine.

CLASS XXVI, weighing 4 pounds 2 ounces:
78. Winchester repeater.

NOTE.—These weights comprise the working parts of the system. The other parts, such as the stocks, barrels, &c., varied so much as to make a comparison between them of no value. Fractions of ounces were not considered.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BARREL WHICH IS SLIDING.

GARDNER'S MAGAZINE.

GARDNER MAGAZINE-ARM, No. 87.

Using the Russian-Berdan brass cartridge, and firing eight shots from a magazine-tube lying beneath the barrel.

Removed before an opportunity was given to photograph it.

Three motions as a magazine-arm, viz: Opened; closed; fired.

Four motions as a single-loader, viz: Opened; loaded; closed; fired.

Opened.—In this arm the barrel and tip-stock slide forward and backward on ways connected with the butt-stock. They are released to move forward, and secured when back, by a hook into which the forward end of the trigger-guard is formed. This guard revolves to a sufficient extent for this purpose, on a pin passing through it, at the forward end of the guard-bow. It locks the piece automatically when it is closed, by the action of a spring at its rearmost end. In moving out the barrel, the hammer is cocked by an internal connection between the barrel and the tumbler. A cartridge having been expelled backward from the magazine by the action of the magazine-spring, it is raised by the striking of a projection on the lower end of the barrel against the forward end of a bent lever, the rearmost end of which lies beneath the cartridge. This passes it up a pair of guides on the face of the frame, so shaped as to hold within their jaws the head of the cartridge by the rim. When it arrives opposite to the mouth of the chamber, it is passed into it by closing the piece.

Closed.—By drawing back the barrel and tip-stock into their original positions with the left hand.

Locked.—The cartridge is introduced into the chamber and the moving parts locked, as above described.

Fired.—The piece can then be fired by a center-lock of the usual pattern, the trigger being blocked by the trigger-guard until the barrel is completely closed.

Extraction.—By repeating the movements, as described, the succeeding cartridge will pass up the guides as before, and, striking from below the empty one just fired, will throw up the guides with sufficient force to send it clear of the gun. The magazine is charged through the trough into which the space between the ways is formed. The issue of the cartridges from the magazine is limited to one at each forward motion of the barrel, by the interposition of a spring-stop, which is pressed out of the way by the barrel at the end of its stroke.

Cut off.—The magazine can be cut off and held in reserve by a revolving eccentric stop, moved by a thumb-piece on the outside.

Single-loader.—The arm can then be used as a single-loader, by inserting the rim of the cartridges into the guides at each opening of the piece.

By a cam-motion of the movable trigger-guard power is obtained to start the barrel slightly away from the butt, and thus to overcome the chief obstacle to the removal of the empty shell, viz: its sticking at the start.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BARREL, WHICH ROTATES ABOUT AN AXIS PARALLEL TO THE AXIS OF THE BARREL.

SCOTT'S.

HELM.

SCOTT MAGAZINE-CARBINE No. 3.

Four motions as a magazine-arm, viz: Cocked, opened, closed, and fired.

As a single-loader, five motions, viz: Cocked, opened, loade l closed, and fired.

Opened.—By cocking the hammer, releasing the barrel-catch, and allowing the barrel to revolve on an axis parallel to and beneath it, until the chamber comes opposite to the magazine. It swings aside the magazine-lid as it passes over the mouth of the magazine, nd is automatically loaded by the action of the magazine-spring.

Closed.—By reversing the action of the barrel, the barrel-catch springs into place and holds it shut.

Locked.—By the noses of the barrel-catch and hammer engaging with corresponding notches in the end of the barrel.

Fired.—By a center-lock of the usual pattern.

Extraction.—By a sliding extractor moving in a spiral-cam recess on the axis during the revolution of the barrel.

Ejection.—None. The shell dropping out as the gun is opened.

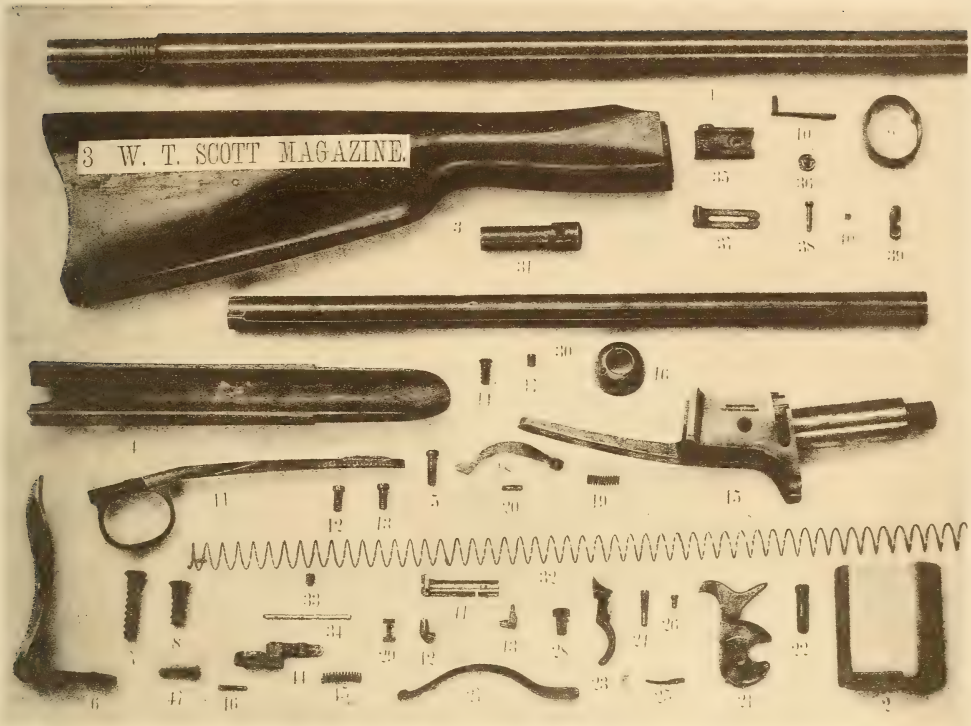
The magazine lies in the butt-stock, is charged from in front, and is closed by a sliding lid, which is kept in place by the action of a suitable spring.

HELM, No. 56.

Withdrawn before being photographed.

A revolving carbine, the peculiar feature of which is the connection of the tumbler with a movable butt-plate, so arranged that by pressing the piece against the shoulder, in aiming, the hammer may be simultaneously cocked.

The cylinder also can be conveniently removed from the side, and replaced by a loaded one, if desired.



35 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

3 Butt Stock,
4 Tip Stock.

FOURTEEN *principal metallic parts not otherwise mentioned:*

2 Receiver,
15 Breech Frame,
16 Breech Frame Nut,
21 Hammer,
18 Barrel Catch,
11 Guard,
23 Trigger,
30 Magazine,
31 Magazine Plunger,
44 Magazine Lid,
41 Extractor,
42 Extractor Lever,
43 Extractor Lever,
29 Main Spring Swivel.

THIRTEEN *Screws:*

5 Tip Stock Screw,
17 Breech Block Nut Screw,
22 Hammer Screw,
20 Barrel Catch Spr. Screw,
12 Guard Screw,
13 Guard Screw,
47 Guard Screw,
14 Tang Screw,
24 Trigger Screw,
26 Trigger Spring Screw,
28 Main Spring Screw,
33 Magazine Plunger Screw,
46 Magazine Stop Screw.

ONE *Pin:*

34 Magazine Plunger Spring Pin.

FIVE *Springs:*

19 Barrel Catch Spring,
25 Trigger Spring,
27 Main Spring,
32 Magazine Spring,
45 Magazine Stop Spring.

13 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
6 Butt Plate,
7 Butt Plate Screw,
8 Butt Plate Screw,
9 Band,
10 Band Spring,
35 Rear Sight Base,
36 Rear Sight Base Screw,
37 Rear Sight Leaf,
38 Rear Sight Joint Screw,
39 Rear Sight Leaf Slide,
40 Rear Sight Leaf Screw.

W. T. SCOTT (MAGAZINE), No. 3.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BARREL, WHICH ROTATES ABOUT AN AXIS AT 90° TO THE AXIS OF THE BARREL, AND—

1. VERTICAL IN THE PLANE OF THE AXIS OF THE BARREL.

PRUSSIAN NEEDLE-CARBINE.

PRUSSIAN NEEDLE-CARBINE.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—By turning the lever back and to the right; in so doing the barrel is moved forward by the eccentric as far as the corresponding arm of the heart-shaped slot in the tang of the receiver will permit the rear guide-stud to go. By the same means the butt of the barrel is swung around to the right, so that the mouth of the chamber may be readily reached with the load. As the eccentric turns, the eccentric plate, which is on the same shaft with it, turns also; and by means of the connecting-rod, which is linked at its forward end to the eccentric plate and in rear to the cocking-bolt, slides the latter backward against the pressure of the spiral mainspring surrounding the stem of the needle-bolt, against the face of which the vertical arm of the cocking-bolt presses. This motion is so timed, that at the moment the piece is fully opened, the nose of the spring-sear riding over the beveled shoulder of the fillet on the needle-bolt, catches against its square face, and retains the bolt against the pressure of the mainspring, when, in order to load the piece, the resistance of the hand has been withdrawn.

Closed.—By returning the lever to its place beneath the barrel, the barrel is first swung round in the prolongation of its original position, and is then drawn back so that the gas-plug projecting from the receiver shall enter the mouth of the chamber.

Fired.—By the means described in the Prussian needle-gun, (q. v.) In case of a failure to ignite the charge, the piece, without opening it, may be recocked by the means therein described.

The arm using a self-consuming cartridge-case, no extracting or ejecting apparatus is needed.

The enormous swell left at the muzzle of this piece, it is supposed, is intended to protect it from the indentations likely to occur in use in the mounted service.

41 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

EIGHTEEN *principal metallic parts not otherwise mentioned:*

5 Guard Strap,
8 Guard,
15 Receiver,
25 Eccentric,
27 Eccentric Guide Plate,
30 Eccentric Plate,
31 Connecting Rod,
33 Cocking Bolt,
34 Cocking Bolt Cover,
36 Lever,
37 Lever Stop,
39 Trigger,
44 Gas Plug,
45 Needle,
45 Needle Spindle,
46 Needle Guide,
47 Needle Bolt,
51 Lock Tube.

FOURTEEN *Screws:*

6 Guard Strap Screw,
7 Guard Strap Screw,
9 Guard Screw,
10 Guard Screw,
16 Guide Stud Screw,
17 Guide Stud Screw,
22 Tang Screw,
26 Eccentric Screw,
28 Eccentric Guide Plate Scr.
29 Eccentric Guide Plate Scr.
32 Cocking Bolt Screw,
35 Cocking Bolt Cover Scr.,
38 Lever Stop Screw,
42 Spring Sear Screw.

ONE *Pin:*

40 Trigger Pin.

THREE *Springs:*

48 Spring Catch,
43 Main Spring,
41 Spring Sear.

FOUR *other minor parts:*

18 Guide Stud Scr'w Washer,
19 Guide Stud Scr'w Washer,
49 Needle Bolt Washer,
50 Needle Bolt Washer.

16 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Stock Swivel,
3 Stock Swivel Screw,
4 Stock Swivel Hinge Scr.,
11 Butt Plate,
12 Butt Plate Screw,
13 Butt Plate Screw,
14 Barrel, Front Sight, Rear Sight Base and Swivel Stud,
23 Rear Sight Leaf,
24 Rear Sight Leaf Screw,
5 Swivel Ring,
5 Swivel Ring,
20 Band Swivel,
21 Band Swivel Screw.

NEEDLE CARBINE, (GERMAN).

NEEDLE-CARBINE.—German.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BARREL, WHICH ROTATES ABOUT AN AXIS AT 90° TO AXIS OF BARREL, AND

2. HORIZONTAL AND BENEATH THE BARREL.

WOHLGEMÜTH.

WOHLGEMÜTH, Nos. 16 and 17.

Withdrawn before being photographed.

These arms, on the general plan of the Lefaucheux system of fowling-pieces, are essentially alike, and use pin-fire cartridges. One of the barrels is provided with a rifled lining which, being removed, shows a smooth-bore barrel of larger caliber for the use of cartridges containing buck-shot.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK WHICH SLIDES IN THE LINE OF THE BARREL BY DIRECT ACTION, *I. E., BOLT-GUNS* WHICH HAVE—

1. CONCEALED LOCKS.

PRUSSIAN NEEDLE-GUN.

DREYSE'S IMPROVED NEEDLE-GUN.

CHASSEPOT.

WARD-BURTON.

MAUSER.

VETTERLIN.

GREENE, No. 14.

MILBANK, No. 51.

LEE, No. 53.

PRUSSIAN NEEDLE-GUN.

Six motions, viz: Released; opened; loaded; closed; cocked; fired.

Opened.—By releasing the spring-catch by pressing down upon it, and then drawing it back by the thumb. This slides the projecting thumb-piece of the lock-tube out of its square notch in the receiver, and allows the handle of the breech-bolt to be raised to a vertical position and the bolt itself to be withdrawn.

Closed.—The piece may then be closed by reversing the movement of the bolt, and—

Locked.—By turning down the base of the handle against the recoil-shoulder formed for it on the receiver.

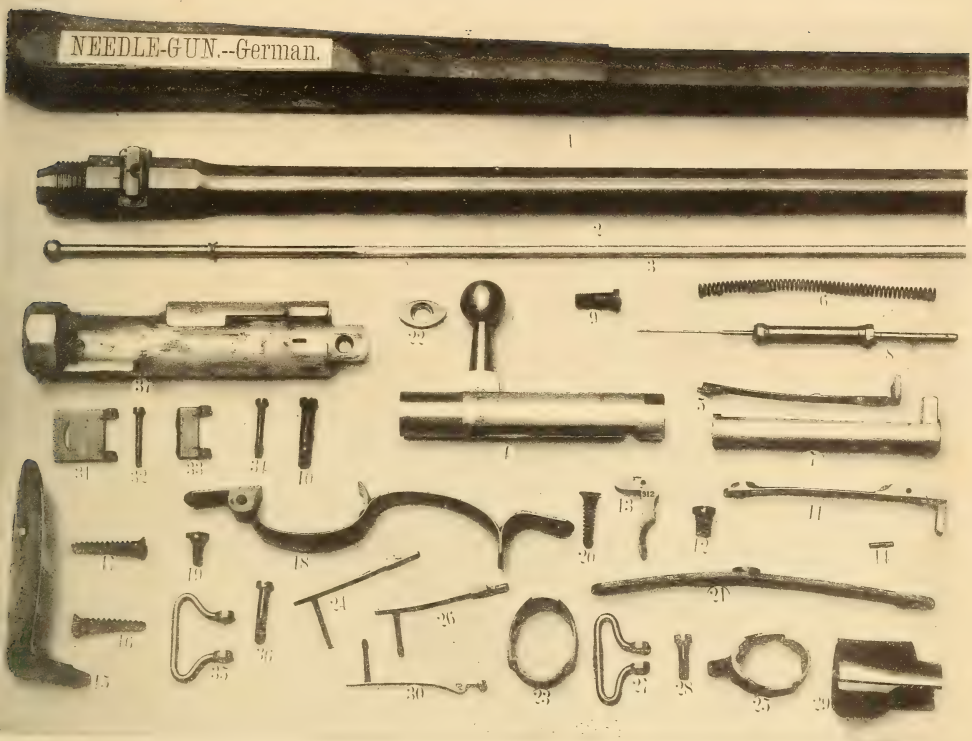
Fired.—In the act of closing, the front shoulder of the needle-bolt, around the stem of which the mainspring is coiled, catches against the nose of the sear and pushes the lock-tube out to the rear by means of the mainspring included between them. By then pushing forward with the hand the base of the lock-tube until the spring-catch above it engages with a corresponding notch in the upper surface of the bore of the breech-bolt, the mainspring is compressed, so that when the sear is pulled out of the way by the trigger, the needle may be darted forward, and, guided by a small hole in the face of the bolt, find its way through the powder in the cartridge to explode the fulminate lying in the base of the paper sabot which surrounds the ball.

The cartridge being self-consuming, no extracting or ejecting devices are required.

The butt of the barrel is chamfered, and the face of the breech-bolt is counter-bored at the same angle, so as to make a close fit and to prevent as far as possible the escape of gas.

The recoil-shoulder on the receiver is inclined to the front, so that as the ends of the barrel and breech-bolt wear off, the bolt may be brought forward to supply their loss. The arm may be cocked independently of the bolt, by first withdrawing, and then shoving forward the lock-tube.

The system may be dismounted by withdrawing the bolt, and at the same time pulling hard on the trigger; this causes a change of fulcrum to the rearmost of the scolloped surfaces, into which its upper side is formed, and permits the nose of the sear to be pulled completely out of the way for the passage of the bolt.



19 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

EIGHT *principal metallic parts not otherwise mentioned:*

4 Breech Bolt,
8 Needle,
8 Needle Bolt,
7 Lock Tube,
13 Trigger,
18 Guard,
21 Trigger Plate,
37 Receiver.

FIVE *Screws:*

9 Recoil Screw,
10 Tang Screw,
12 Spring Sear Screw,
19 Guard Screw, Upper
20 Guard Screw, Lower

ONE *Pin:*

14 Trigger Pin.

THREE *Springs:*

6 Main Spring,
5 Spring Catch,
11 Spring Sear.

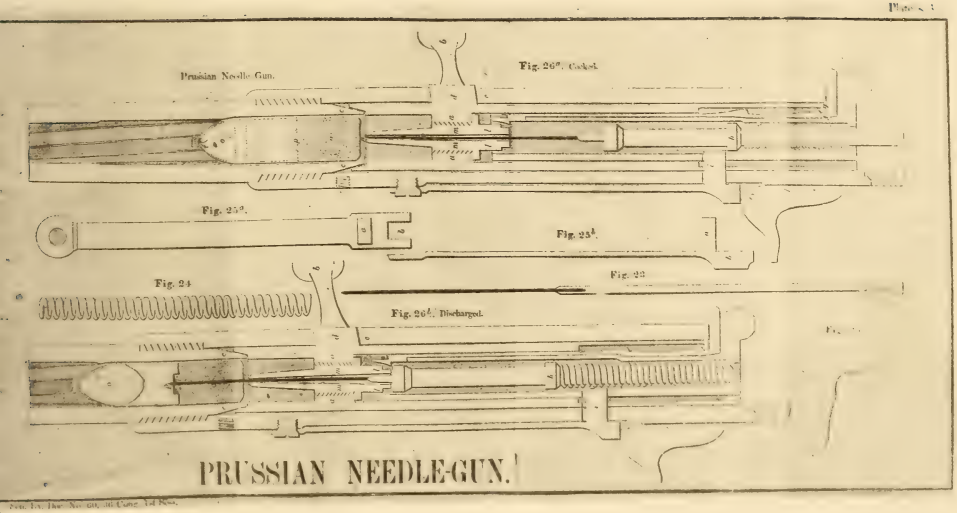
ONE *other minor part:*

22 Recoil Screw Escutcheon.

21 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

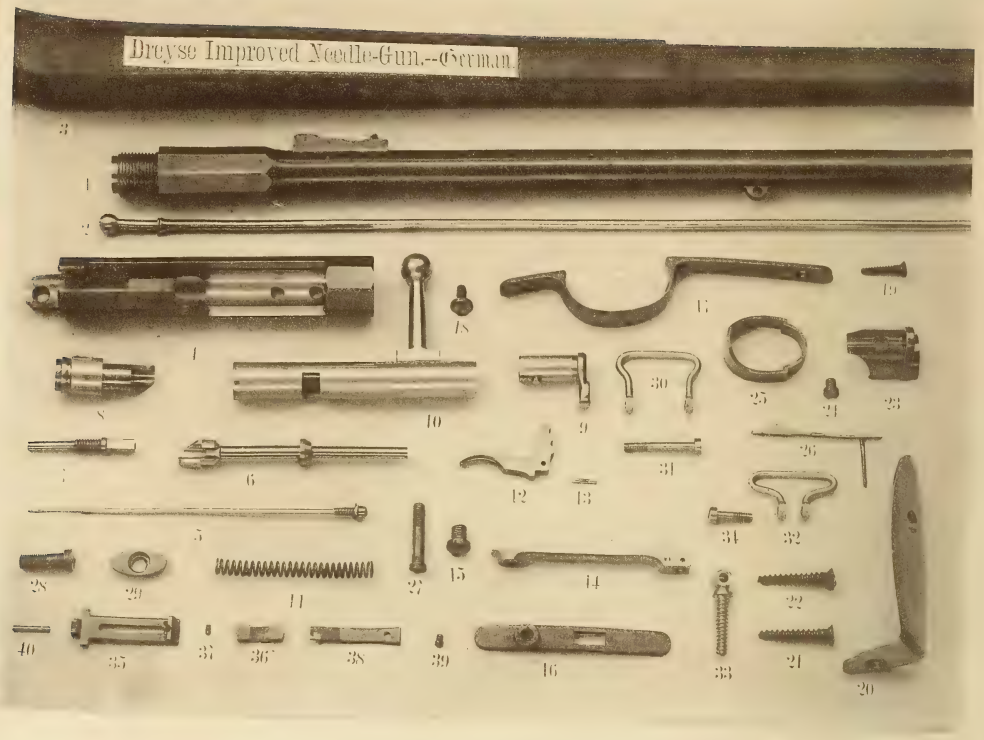
2 Barrel, Front Sight and Rear Sight Base,
3 Ramrod,
15 Butt Plate,
16 Butt Plate Screw,
17 Butt Plate Screw,
23 Lower Band,
24 Lower Band Spring,
25 Middle Band,
26 Middle Band Spring,
27 Middle Band Swivel,
28 Middle Band Screw,
29 Upper Band,
30 Upper Band Spring,
31 Rear Sight Leaf, Long
32 Rear Sight Leaf, Long Scr.
33 Rear Sight Leaf, Short
34 Rear Sight Leaf, Short Screw,
35 Guard Swivel,
36 Guard Swivel Screw.

NEEDLE GUN, (GERMAN).



PRUSSIAN NEEDLE-GUN.

Ser. Ex. Doc. No. 60, 46 Cong. 3d Sess.



20 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

3 Stock.

TEN *principal metallic parts not otherwise mentioned:*

4 Receiver,
5 Needle,
6 Needle Bolt,
7 Needle Guide,
8 Recoil Block,
9 Thumb Piece,
10 Breech Bolt,
12 Trigger,
16 Trigger Plate,
17 Guard.

FIVE *Screws:*

15 Spring Sear Screw,
18 Guard Screw,
19 Guard Screw,
27 Tang Screw,
28 Recoil Screw.

ONE *Pin:*

13 Trigger Pin.

TWO *Springs:*

14 Spring Sear,
11 Main Spring.

ONE *other minor part:*

29 Recoil Screw Escutcheon.

26 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel, Front Sight, Rear Sight Base, Tip Stud, Recoil Stud, Bayonet Stud, Ramrod Stop,
2 Ramrod,
20 Butt Plate,
21 Butt Plate Screw,
22 Butt Plate Screw,
23 Tip,
24 Tip Screw,
25 Band,
26 Band Spring,
30 Upper Swivel,
31 Upper Swivel Screw,
32 Lower Swivel,
33 Lower Swivel Screw,
34 Lower Swivel Joint Scr.,
35 Rear Sight Leaf,
36 Rear Sight Leaf Slide,
37 Rear Sight Leaf Screw,
38 Rear Sight Spring,
39 Rear Sight Spring Screw,
40 Rear Sight Joint Pin.

DREYSE IMPROVED NEEDLE GUN, (GERMAN).

DREYSE IMPROVED NEEDLE-GUN.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—By raising the handle of the breech-bolt to a vertical position, and then withdrawing it to the extent permitted by the form of the slot in the receiver in which it slides. In turning up the handle, the needle-bolt is forced back against the pressure of the mainspring which surrounds its stem, by means of a spiral shoulder near its head, which rides over a corresponding helical surface on the stem of the recoil-block. The needle-bolt is compelled to turn with the breech-bolt by means of a projection on its head which slides to and fro in a longitudinal groove in the bore of the breech-bolt; and the recoil-block is prevented from turning with the breech-bolt by a similar projection sliding in a corresponding groove in the receiver. When fully forced back and the pressure of the hand removed, the needle-bolt is kept from being thrown forward by the mainspring by means of a square portion of its face coming against a corresponding part of the back surface of the recoil-block. Supported in this way, the needle-bolt moves back with the other parts during the opening of the piece.

Closed.—When the breech is closed by the usual means the needle-bolt catches against the nose of the sear, and is retained by it.

Fired.—By the act of turning down the handle into place, the square end of the needle-bolt is rotated off its bearing on the stem of the recoil-block, leaving the needle-bolt and the needle free to be driven forward by the mainspring, when the sear is pulled out of its way by the trigger, as in the Prussian needle-gun, p. 252.

Locked.—It is locked in the same manner therein described.

The other remarks also apply.

The arm may be cocked without opening it, if so desired, by drawing back the needle-bolt by means of the thumb-piece, until the nose of the sear catches against the fillet on the needle-bolt as before described. By then pressing forward the thumb-piece till a stud on its upper surface engages in the transverse arm of an L-shaped slot in the breech-bolt, the mainspring is compressed, and may be released as above described.

The thumb-piece and needle-bolt are connected together by the needle, which passes through a small hole in the base of the thumb-piece, and is screwed into the rear end of the needle-bolt.

CHASSEPOT.

Five motions, viz: Cocked; opened; loaded; closed; fired.

Opened.—In drawing back the cocking-piece out of the slot in the receiver to its full extent, with the hand, it compresses the spiral mainspring surrounding the needle-bolt, which is screwed into the face of the cocking-piece. When the pressure of the hand is removed, the cocking-piece is kept from flying forward, by engaging with the nose of the spring-sear, over which it has ridden in the act of withdrawal. A stud in the lower surface of its projecting lip, having then disengaged itself from a corresponding notch in the upper surface of the breech-bolt, the latter may be revolved by its handle and withdrawn. It is stopped by the front end of a groove on its right side, striking against a stop-screw in the side of the receiver.

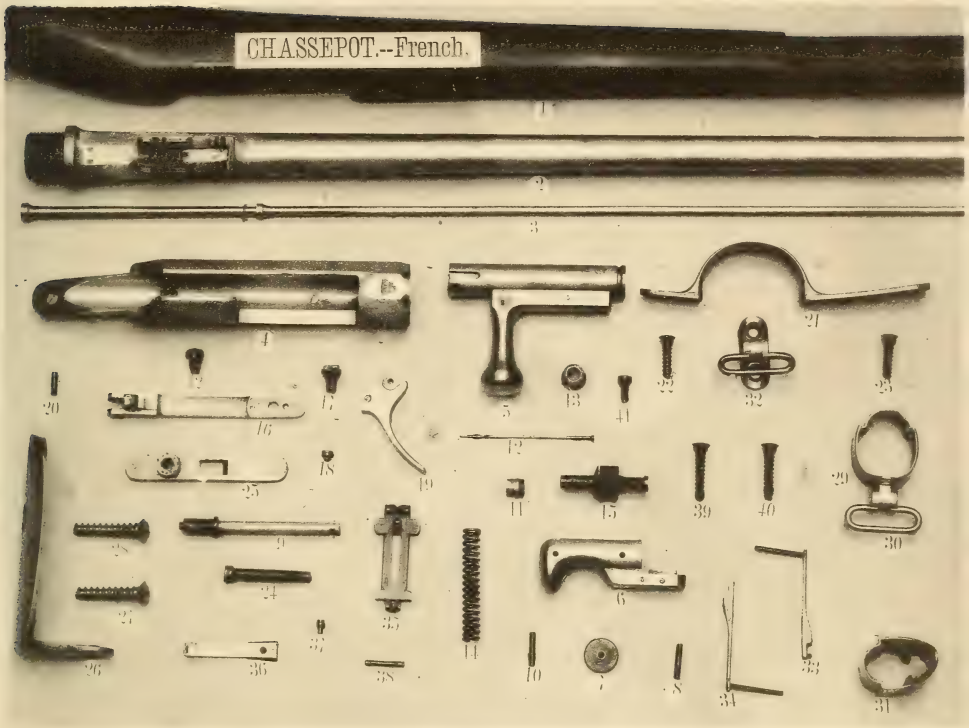
When disengaged from the sear, by the withdrawal of the bolt in opening the piece, the cocking-piece is still kept cocked by the revolution of the bolt having brought the notch before spoken of away from in front of the stud on the cocking-piece, so that it now rests directly on the rear face of the breech-bolt. When the piece is closed, the stud again returns opposite to the notch, but, as before, is kept from entering it by engaging with the spring-sear.

Closed.—By reversing the former movement of the bolt.

Locked.—By the support afforded the base of the handle by a corresponding mortise in the side of the receiver.

Fired.—By disengaging, through the pressure of the trigger, the nose of the sear from its hold against the face of the cocking-piece. This allows the mainspring to impel it forward to the depth of its notch in the breech-bolt and to drive the needle, which it holds, against the percussion-cap in the bottom of the cartridge. At the moment of the discharge, the middle portion of the washer surrounding the rear stem of the needle-guide, being made of soft rubber, while the extremities are of harder material, is laterally expressed against the walls of the chamber by the longitudinal motion permitted to the guide, and by so closing the mouth of chamber, prevents the escape of gas.

A friction-roll in the cocking-piece allows it to move freely notwithstanding the downward pressure of the thumb in opening. The arm using a self-consuming cartridge, the usual devices for extraction and ejection are dispensed with. Close to the firing-notch in the breech-bolt is a shallower notch, into which, by turning the bolt to a proper point, the cocking-piece may be let down into a position of safety.



27 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

ELEVEN *principal metallic parts not otherwise mentioned:*

4 Receiver,
5 Breech Bolt,
6 Cocking Piece,
9 Needle Bolt,
11 Needle Holder,
12 Needle,
15 Needle Guide and Rubber Washer,
19 Trigger,
21 Guard,
25 Trigger Plate.

EIGHT *Screws:*

13 Needle Bolt Screw,
17 Spring Sear Screw,
18 Spring Sear Stop Screw,
22 Guard Screw,
23 Guard Screw,
24 Tang Screw,
41 Needle Bolt Stop Screw,
42 Breech Bolt Stop Screw.

THREE *Pins:*

8 Cocking Piece Roll Pin,
10 Needle Bolt Pin,
20 Trigger Pin.

TWO *Springs:*

14 Main Spring,
16 Spring Sear.

ONE *other minor part:*

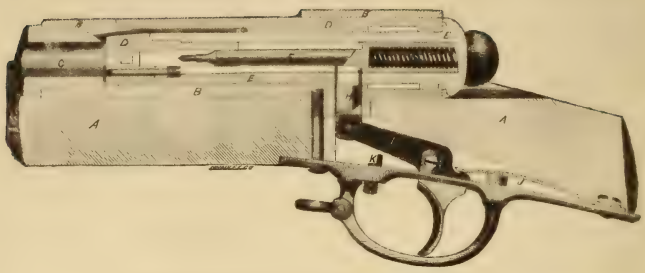
7 Cocking Piece Roll.

24 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Barrel, Front Sight, Bayonet Stop and Rear Sight Base,
3 Ramrod,
26 Butt Plate,
27 Butt Plate Screw,
28 Butt Plate Screw,
29 Lower Band,
30 Lower Band Swivel & Pin,
31 Upper Band,
32 Butt Stock Swivel Plate, Swivel and Pin,
33 Upper Band Spring,
34 Lower Band Spring,
35 Rear Sight Leaf and Leaf Slide,
36 Rear Sight Spring,
37 Rear Sight Spring Screw,
38 Rear Sight Joint Pin,
39 Butt Stock Swivel Plate Screw,
40 Butt Stock Swivel Plate Screw.

CHASSEPOT.

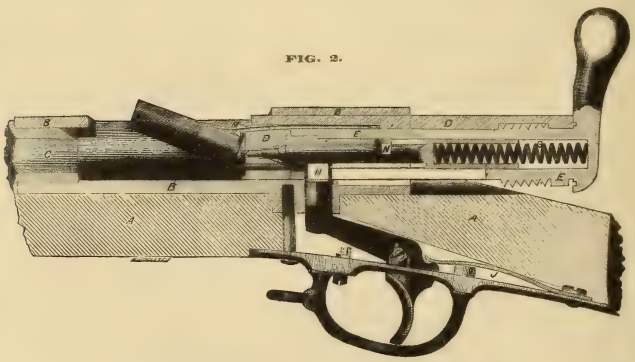
FIG. 1.



BREECH SYSTEM. Sectional View when ready for Firing.

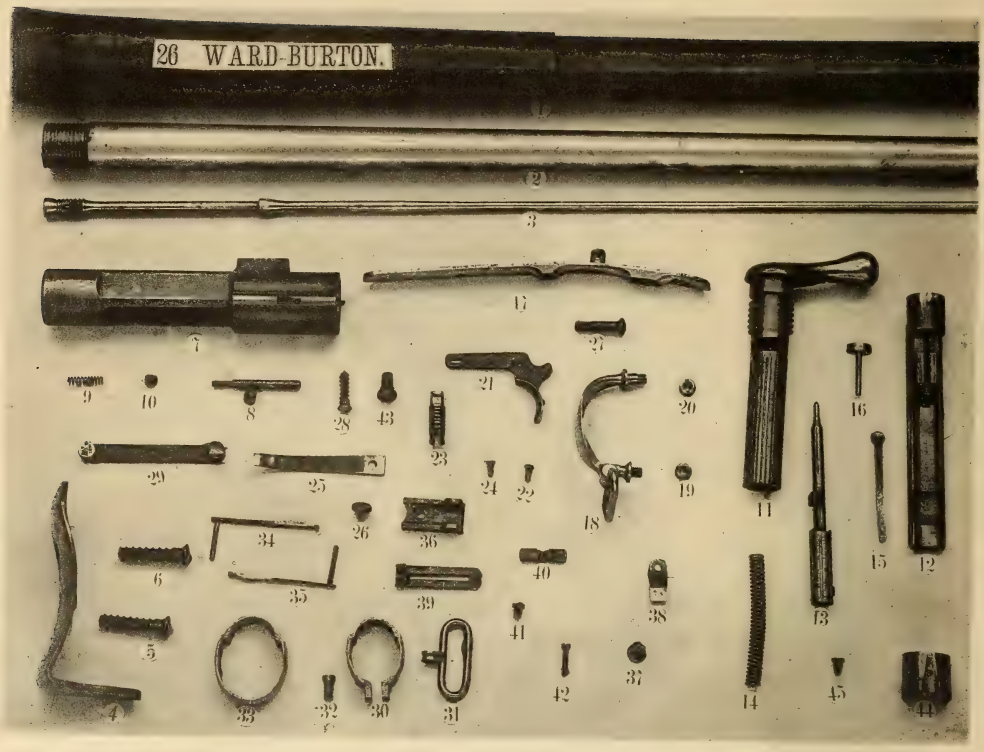
A. Stock,
B. Receiver,
C. Chamber,
D. Recoil Block,
E. Breech Bolt,
F. Firing Pin,
G. Main Spring,
H. Sear Bolt,
I. Trigger,
J. Trigger Spring,
K. Trigger Stop Screw,
L. Ejector,
M. Extractor,
N. Firing Pin Cam,
O. Empty Shell.

FIG. 2.



BREECH SYSTEM. Sectional View when Open, ejecting Shell.

WARD-BURTON MUSKET. FIGS. 1, 2



25 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

ELEVEN *principal metallic parts not otherwise mentioned:*

7 Receiver,
8 Locking Bolt,
11 Breech Bolt,
12 Recoil Block,
12 Firing Pin Guide,
13 Firing Pin,
16 Ejector,
17 Guard Plate,
18 Guard Bow,
21 Trigger,
23 Sear Bolt.

SEVEN *Screws:*

10 Locking Bolt Screw,
19 Guard Bow Nut,
20 Guard Bow Nut,
43 Sear Bolt Stop Screw,
26 Trigger Spring Screw,
27 Upper Guard Screw,
28 Lower Guard Screw.

TWO *Pins:*

22 Trigger Pin,
24 Sear Bolt Pin.

FOUR *Springs:*

9 Locking Bolt Spring,
14 Main Spring,
25 Trigger Spring,
15 Spring Extractor.

25 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Barrel and Front Sight,
3 Ramrod,
4 Butt Plate,
5 Butt Plate Screw,
6 Butt Plate Screw,
30 Upper Band,
34 Upper Band Spring,
31 Upper Band Swivel,
32 Upper Band Swivel Scr.,
33 Lower Band,
35 Lower Band Spring,
36 Rear Sight Base,
37 Rear Sight Base Screw,
38 Rear Sight Spring,
39 Rear Sight Leaf,
40 Rear Sight Leaf Slide,
41 Rear Sight Leaf Screw,
42 Rear Sight Joint Screw,
44 Tip,
45 Tip Screw,
18 Guard Bow Swivel and Pin,
29 Ramrod Stop, Upper
1 Ramrod Stop, Lower

WARD-BURTON, No. 26.

WARD-BURTON, No. 26.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—By turning up the handle of the breech-bolt so as to disengage the threads of the sectional screw, and then withdrawing the bolt.

Closed.—By reversing the same, in so doing cocking the piece.

The motion of turning up the handle, in opening the piece, serves to revolve the firing-pin on its axis, and to cause a spiral shoulder near its head to bear against a corresponding surface into which the back of the firing-pin guide is formed. The point of the firing-pin is thus retracted from the face of the bolt in the closing of the piece, so as to avoid the accidental explosion of the cartridge during this operation. In turning down the handle these shoulders are no longer opposed, and the firing-pin may then be driven forward in the usual way. For a similar reason, the face of the bolt is made somewhat concave.

Locked.—By engaging the sectional male-screw thread on the bolt with the corresponding nut within the receiver.

Fired.—By a concealed lock moved by a spiral mainspring. The piece is cocked by compressing the mainspring by means of the firing-pin, which resting upon it, and catching on the sear-bolt in closing, is held back by it against the resistance of the mainspring, while the breech-bolt passes by, to the extent of the throw permitted the firing-pin. To fire the piece, the sear-bolt is drawn down out of the way by the trigger.

To prevent the sear-bolt from accidentally slipping off the shoulder on the firing-pin, when the mainspring is compressed, the surfaces in contact are internotched, the annular groove so formed on the firing-pin, being cut, so as to permit the passage of the sear-bolt, when the breech-bolt is turned down into the position of firing.

Extraction.—By a spring-hook recessed on top of the bolt, and riding over the rim of the cartridge in closing.

Ejection.—By a loose pin playing through the face of the bolt diametrically opposite to the extractor. This pin strikes the front of the sear-bolt in opening the piece. It thereby impinges against the lower edge of the cartridge-head, and throws the cartridge-shell upward around the hook of the extractor, by which it is held, until it is clear of the gun.

Half-cocked.—By the end of the locking-bolt engaging in a corresponding recess in the base of the handle of the breech-bolt, when it is released by the thumb and the handle turned up to meet it.

The piece may be dismounted by turning aside a stop-screw beneath the horizontal arm of the trigger. The sear-bolt may then be pulled down out of the slot in the bottom of the breech-bolt, so that the bolt may be withdrawn.

NOTE.—This is the arm issued for experimental trial in the field.

WARD-BURTON MAGAZINE-MUSKET, No. 97.

Three motions as a magazine, four motions as a single-loader. As a magazine-gun, opened, closed, fired; as a single loader, see No. 26.

Opened.—As in the musket before described. In drawing back the breech-bolt the front end of the slot in its lower surface strikes the upright lever-arm of the carrier and throws up the tray in which its forward part is formed. This tray supports a cartridge slantingly, so that the upper portion of the cartridge-head shall project slightly above the bottom of the groove in which the bolt slides, while the point of the bullet is opposite the mouth of the chamber. The carrier is kept in this position by the action of the carrier-lever spring.

Closed.—By reversing the movement of the bolt, its face catches against the head of the cartridge and shoves it up the incline of the carrier into the chamber. As its movement is completed the back end of the slot strikes the carrier-lever and forces down the carrier opposite the mouth of the magazine. In its descent it strikes a spring-catch magazine-stop operating to restrain the issue of the cartridges from the magazine, and allows one to come out upon the tray.

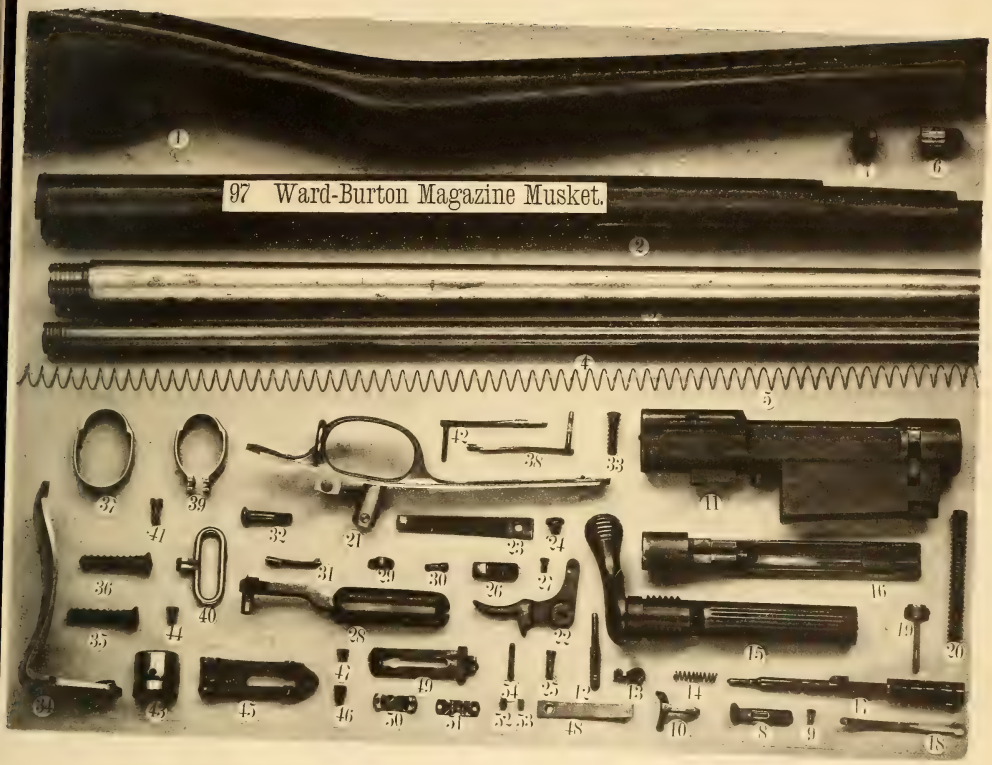
Fired—Locked—Ejection—Extraction.—By the plan before described.

The issue of cartridges from the magazine may be cut off by a slide operated by a projecting thumb-piece. The piece may then be used as a single-loader, holding the magazine in reserve.

The head of the follower is covered with India rubber in order to serve as a cushion for the rebound of the cartridges in firing.

The magazine is charged from below by drawing back the bolt, thus raising the carrier and exposing the mouth of the magazine for the successive introduction of the cartridges; when placed in the magazine the cartridges are retained there by the spring-catch above mentioned.

This arm uses a special ammunition, the general plan of which is that of the cup-anvil service-cartridge. The fulminate is protected from accidental ignition in the magazine by lying at the apex of a central pocket formed in the cartridge-head.



34 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

1 Butt Stock,
2 Tip Stock.

EIGHTEEN *principal metallic parts not otherwise mentioned:*

4 Magazine,
6 Magazine Follower,
8 Magazine Cut-Off,
10 Magazine Cut-Off Stop,
11 Receiver,
12 Locking Bolt,
13 Lock'g Bolt Thumb Piece,
15 Breech Bolt,
16 Recoil Block,
16 Firing Pin Guide,
17 Firing Pin,
18 Extractor,
19 Ejector Pin,
21 Guard Plate,
22 Trigger,
26 Sear Bolt,
28 Carrier,
29 Carrier Fly.

EIGHT *Screws:*

7 Mag. Spring Stop Screw,
9 Magazine Cut-Off Screw,
24 Trigger Spring Screw,
25 Trigger Screw,
27 Sear Bolt Screw,
30 Carrier Fly Screw,
32 Guard Screw, Upper
33 Guard Screw, Lower

FIVE *Springs:*

5 Magazine Spring,
14 Locking Bolt Spring,
20 Main Spring,
23 Trigger Spring,
31 Carrier Spring.

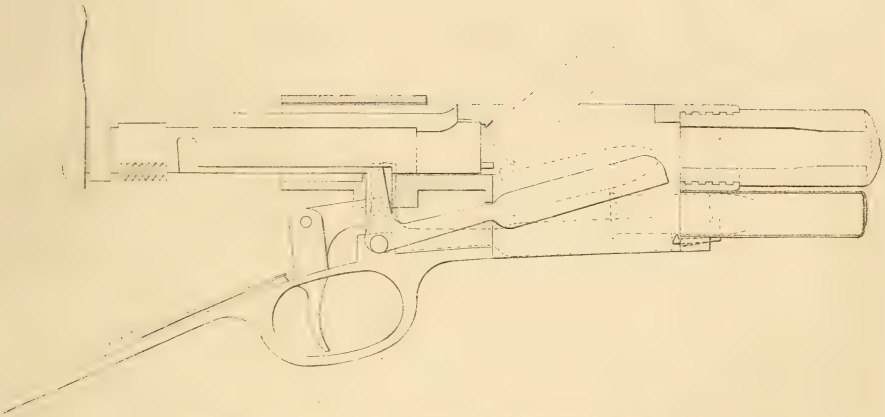
ONE *other minor part:*

3 Recoil Stud.

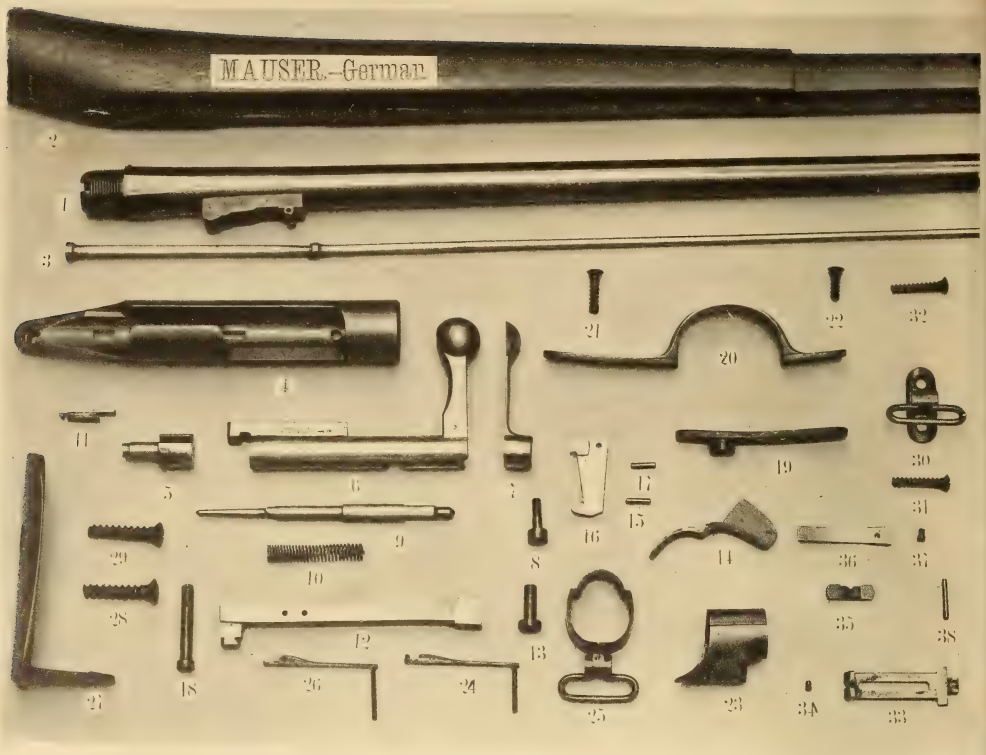
25 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

3 Barrel and Front Sight,
21 Guard Plate, Swivel and Screw.
34 Butt Plate,
35 Butt Plate Screw,
36 Butt Plate Screw,
37 Lower Band,
38 Lower Band Spring,
39 Upper Band,
40 Upper Band Swivel,
41 Upper Band Swivel Scr.,
42 Upper Band Spring,
43 Tip,
44 Tip Screw,
45 Rear Sight Base,
46 Rear Sight Base Screw,
47 Rear Sight Base Screw,
48 Rear Sight Spring,
49 Rear Sight Leaf,
50 Rear Sight Leaf Slide,
51 Rear Sight Leaf Slide Cap,
52 Rear Sight Leaf Slide Cap Screw,
53 Rear Sight Leaf Slide Cap Screw,
54 Rear Sight Joint Pin.

WARD BURTON MAGAZINE MUSKET, No. 97.



97 Ward-Burton Magazine Musket.



20 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

2 Stock.

NINE *principal metallic parts not otherwise mentioned:*

4 Receiver,
6 Breech Bolt,
5 Recoil Block,
9 Firing Pin,
11 Extractor,
14 Trigger,
16 Ejector,
19 Tang Screw Plate,
20 Guard Plate.

FIVE *Screws:*

8 Main Spring Screw,
13 Spring Sear Screw,
18 Tang Screw,
21 Guard Screw,
22 Guard Screw.

TWO *Pins:*

15 Trigger Pin,
17 Ejector Pin.

THREE *Springs:*

7 Spring Hammer,
10 Firing Pin Spring,
12 Spring Sear.

25 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel, Rear Sight Base, Front Sight, Bayonet Stud,
3 Ramrod,
23 Upper Band,
24 Upper Band Spring,
25 Lower Band, Swivel & Pin,
26 Lower Band Spring,
27 Butt Plate,
28 Butt Plate Screw,
29 Butt Plate Screw,
30 Stock Swivel, Plate and Pin,
31 Stock Swivel Plate Screw,
32 Stock Swivel Plate Screw,
33 Rear Sight Leaf,
34 Rear Sight Leaf Screw,
35 Rear Sight Leaf Slide,
36 Rear Sight Spring,
37 Rear Sight Spring Screw,
38 Rear Sight Joint Pin.

MAUSER, (GERMAN).

MAUSER.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—By raising the handle of the breech-bolt to a vertical position and then withdrawing it. It brings back at the same time the recoil-block, over a projection on which, an undercut groove in the forward lip of the bolt, has been engaged by the revolution of the bolt. By this motion also the firing-pin is retracted, since from the flattening of its hinder end, and its passing through an oblong hole in the base of the bolt, it is constrained to turn with the bolt, and the spiral shoulders in front to bear against the corresponding surfaces on the stem of the recoil-block, and by the helical motion thus obtained to force itself back until its point no longer protrudes beyond the face of the block. The recoil-block meanwhile is kept from turning, by the resistance afforded by the projecting extractor, which being dovetailed into the block and plying in a straight groove in the receiver, allows the recoil-block to follow only the longitudinal motions of the bolt.

Closed—Locked.—By reversing the movement of the bolt and turning the handle down, so that a lug at the forward end of the bolt shall engage with a corresponding mortise in the side of the receiver and thereby lock the piece. In shoving forward the bolt, the lower edge of the spring-hammer—the upper end of which is dovetailed into the knob of the handle—catches against the spring-sear and is retained by it during the remaining slight forward motion of the body of the bolt. This motion is imparted to the bolt, by its bearing against the beveled surface of the rear shoulder of the mortise in the receiver, while the handle is turning down into place.

Fired.—When the handle is completely down, a groove in the lower segment of the hammer comes opposite to and just in rear of its bearing on the sear, so that when this is pressed down out of the way by the trigger, the hammer may fly past it, and by striking the firing-pin ignite the charge. The firing-pin is now free to move forward, since by the turning down of the handle, the retracting-shoulders have been brought opposite to the corresponding notches in the stem of the recoil-block. They are prevented from accidentally entering them by the retractile effort of the firing-pin spring, which is strong enough to move the weight of the firing-pin, but not sufficiently powerful to materially diminish the blow of the hammer.

Extraction.—By a closely folded two-leaved spring-hook extractor, dovetailed into the side of the recoil-block and sliding in a groove in the side of the receiver.

Ejection.—By a bent lever lying beneath the receiver, and having the extremities of both its arms projecting through it.

The short upright arm of this lever plays in a groove in the lower side of the bolt, against the forward end of which it is forcibly struck when the bolt is withdrawn. This blow throws up its forward end against the bottom of the cartridge, and thus expels it from the gun. The forward end of the slot in the receiver is beveled vertically, forming a surface against which the end of the bolt may strike in driving the cartridge home. This is intended to diminish the shock against the base of the cartridge, in case of any obstacle to its ready entrance into the chamber. The forward end of the sear groove in the head of the hammer is beveled sidewise, so that the piece may be cocked by simply raising the handle and turning it down again, without withdrawing the bolt.

The breech-bolt may be dismounted by pulling hard on the trigger while withdrawing the bolt, the nose of the sear being thus pulled down out of the way.

VETTERLIN MAGAZINE-MUSKET.—SWISS.

Three motions as a magazine-gun, four as a single-loader, viz: Opened, closed, and fired; and opened, loaded, closed, and fired.

Opened.—By turning up the handle, a pair of spiral cam-shaped surfaces on the interior of the annular body to which it is attached, bears against each arm of the cross-piece on the firing-bolt, and forces it backward against the pressure of the spiral mainspring. This spring surrounds the back portion of the breech-bolt, and abuts against the stop-nut screwed on its rearmost extremity.

When the upward motion of the handle is completed, the spring has been compressed to its full extent, and is kept under tension by the face of the cross-piece leaving the inclined surface of the spiral cam and bearing against the square end of the body of the cam-lever.

The bolt may then be withdrawn in the usual way. At the conclusion of its movement, when no longer obstructing the well of the receiver by lying over it, the end of the groove on its under side strikes against the upright arm of the carrier-lever and throws up its horizontal arm, bearing with it the carrier which supports the cartridge for the next discharge. The breech may then be closed.

Closed.—By reversing the movement of the bolt. In so doing the cartridge is passed into the chamber. When the breech is fully closed, the rearmost end of the groove above referred to, striking the back of the upright arm of the carrier-lever, forces it down into place. It carries with it the carrier to receive from the magazine a fresh cartridge, which is fed down upon it by the magazine-spring.

In then turning down the handle to its original position its body leaves the cross-piece of the firing-bolt, which is now supported against the stress of the mainspring, by its notched arm being engaged with the top of the sear-bolt.

Locked.—By two lugs on the body of the cam-lever, which, in turning down the handle after closing the piece, engage with corresponding recesses in the frame, after the manner of a sectional screw.

Fired.—By pulling down the sear-bolt with the trigger, and thus allowing the firing-bolt to be forcibly impelled against the double-pointed firing-pin, which explodes the charge.

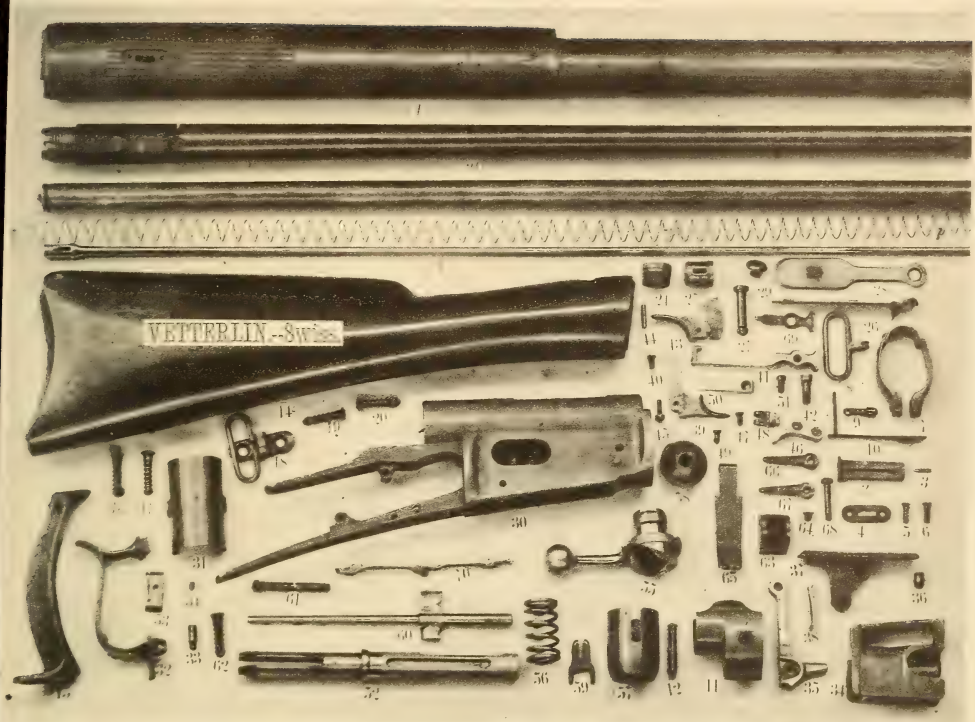
Extraction.—By the usual spring-hook lying on top of the breech-bolt.

Ejection.—By the bottom of the shell being forcibly struck by the rising carrier, at the moment of its complete withdrawal from the chamber.

The magazine is charged through a hole in the side of the frame, which is covered by a swinging lid, and which communicates through a corresponding hole in the side of the carrier with the mouth of the magazine. The magazine can be cut off and held in reserve when the arm is to be used as a single-loader, by blocking the exit of the cartridges at its mouth by means of a transverse arm attached to a lever swinging on the outside of the frame. The cartridges are then introduced singly into the carrier in the usual way. The covers for the well of the receiver and for the mainspring are of sheet iron, and are intended to protect the parts from rain or dust.

The set trigger represented in the photograph is not an invariable adjunct of the arm.

The arm uses a bottle-necked rim-fire cartridge of small capacity.



45 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

1 Tip Stock,
14 Butt Stock.

TWENTY-ONE *principal metallic parts not otherwise mentioned:*

2 Recoil Stop,
22 Magazine,
25 Magazine Follower,
26 Magazine Cut-off,
28 Loading Lid,
30 Receiver,
32 Guard Bow,
34 Carrier,
35 Carrier Lever,
37 Carrier Lever Plate,
39 Trigger,
46 Sear,
48 Sear Bolt,
52 Breech Bolt,
53 Breech Bolt Stop,
55 Breech Bolt Cam Lever,
57 Main Spring Cover,
58 Main Spring Stop,
59 Firing Pin,
60 Firing Bolt,
24 Magazine Spring Stop.

TWELVE *Screws:*

27 Magazine Cut-off Spring Screw,
29 Loading Lid Screw,
33 Guard Bow Screw,
36 Carrier Lever Screw,
40 Trigger Screw,
42 Trigger Spring Screw,
47 Sear Screw,
49 Sear Bolt Screw,
51 Sear Spring Screw,
54 Breech Bolt Stop Screw,
61 Tang Screw,
62 Guard Screw.

TWO *Pins:*

3 Recoil Pin Stop Pin,
52 Spring Extractor Pin.

SEVEN *Springs:*

23 Magazine Spring,
26 Magazine Cut-off Spring,
38 Carrier Lever Spring,
41 Trigger Spring,
50 Sear Spring,
56 Main Spring,
70 Spring Extractor.

ONE *other minor part:*

31 Receiver Slide Cover.

29 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

4 Escutcheon,
5 Escutcheon Screw,
6 Escutcheon Screw,
7 Lower Band,
8 Lower Band Swivel,
9 Lower Band Screw,
10 Lower Band Spring,
11 Upper Band,
12 Upper Band Spring,
13 Ramrod,
15 Butt Plate,
16 Butt Plate Screw,
17 Butt Plate Screw,
18 Butt Stock Swivel Plate and Swivel,
19 Butt Stock Swivel Plate Screw,
20 Butt Stock Swivel Plate Screw,
21 Barrel and Front Sight,
63 Rear Sight Base,
64 Rear Sight Base Screw,
65 Rear Sight Leaf,
66 Rear Sight Spring,
67 Rear Sight Spring,
68 Rear Sight Joint Screw,
43 Set Trigger,
44 Set Trigger Pin,
45 Set Trigger Stop Screw,
69 Set Trigger Spring.

VETTERLIN, (SWISS).

J. D. GREENE, No. 14.

This gun was removed before an opportunity was given to have it photographed.

Four motions: Opened; loaded; closed; fired.

A bolt-gun with a concealed spiral-spring lock. It is loaded through a mortise cut in the side of the receiver, and is locked by projections on the bolt engaging with corresponding cavities in the receiver. The handle of the breech-bolt is so formed as to lie close to the stock, when turned down and closed.

A detachable magazine or pannier, made of tin, can be connected with the right side of the receiver, and is worked by canting the gun to the left, and allowing a cartridge to roll into the receiver in front of the bolt, when it is withdrawn to load.

MILBANK, No. 51.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—By raising the handle of the breech-bolt from its recoil-bearing in the receiver, and then drawing back the bolt.

Closed.—By reversing the action of the bolt; the hammer-bolt striking the sear-bolt in closing, and thereby compressing the spiral mainspring which surrounds its rear portion.

Locked.—By the support afforded the base of the handle by its bearing on the recoil-shoulder of the receiver when the piece is closed.

Fired.—By the action of a spiral mainspring surrounding the hammer-bolt. The hammer-bolt is kept from accidentally discharging the cartridge by striking the firing-pin before the breech is fully closed, by means of a transverse stop-pin, which, when the handle is up, passes through the firing-pin and keeps it forced back with its point flush with the face of the bolt. When the breech is fully locked by turning down the handle into place, the transverse pin is drawn back by an inclined surface in the hole of the firing-pin through which it passes, and it leaves the firing-pin free to be driven forward at pleasure in the usual way. The rear end of the firing-bolt when drawn back passes through the base of the rear section of the breech-bolt and indicates the position of cocked.

Extraction.—By a hook swinging on a pin passing transversely through the recoil-block near its face.

Ejection.—By the action of a spiral spring set in the face of the bolt and pressing against the lower edge of the cartridge-head until the shell is clear of the chamber. The shell being then free to turn, is rotated around the hook by which it is held and is thrown clear of the gun.

A safety-lever is connected with this arm and serves to dispense with the necessity of a half-cock notch; a projection on its under surface passes through the guard-strap in rear of the bow, and before firing, is to be pressed upward with the outside fingers of the hand, so as to liberate its forward end from its position behind the trigger, which until this has been done is immovably locked.

The accidental opening of the breech may be prevented by turning up the handle part way and pressing down its stop-pin; the point of this passes into a hole in the side of the recoil-block, and thus prevents the revolution of the entire bolt.

26 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

THIRTEEN *principal metallic parts not otherwise mentioned:*

16 Guard Plate,
17 Guard Bow,
25 Trigger,
27 Sear Bolt,
30 Receiver,
31 Recoil Block,
32 Firing Pin,
33 Firing Pin Stop Pin,
34 Extractor,
38 Handle,
39 Handle Stop Pin,
40 Hammer Bolt,
42 Breech Bolt.

SIX *Screws:*

18 Guard Bow Nut,
19 Guard Bow Nut,
22 Guard Plate Scr., Upper
23 Guard Plate Scr., Lower
24 Tang Screw,
26 Trigger Screw.

ONE *Pin:*

35 Extractor Pin.

FOUR *Springs:*

28 Sear Bolt Spring,
36 Extractor Spring,
37 Ejector Spring,
41 Main Spring.

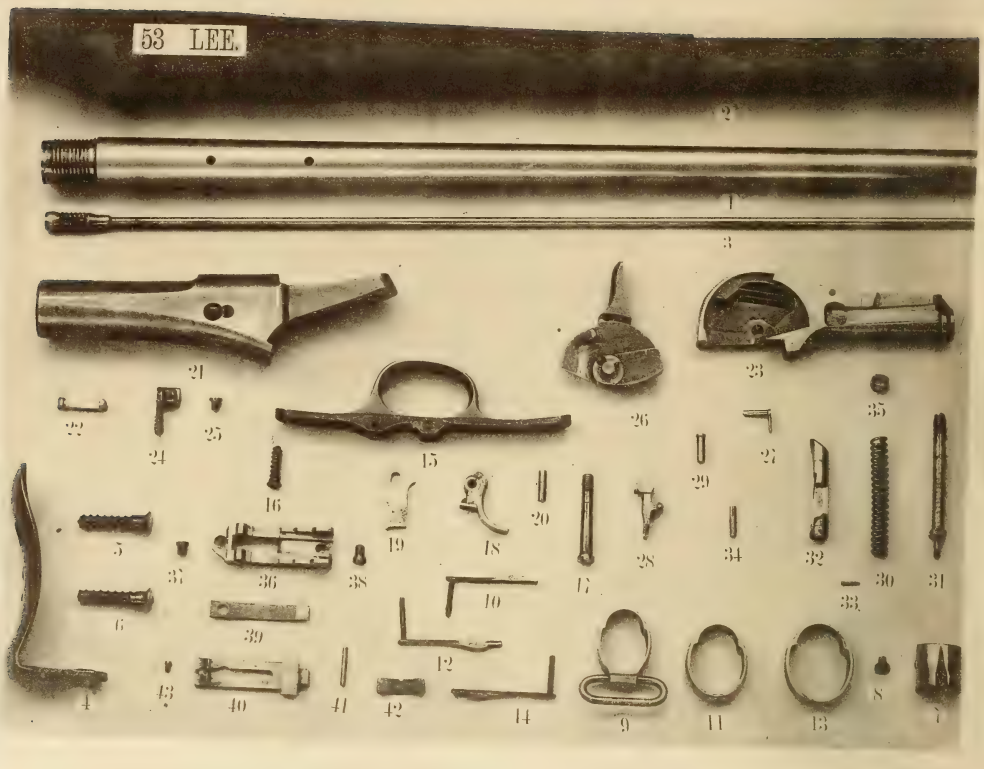
ONE *other minor part:*

29 Safety Lever.

24 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Butt Plate,
3 Butt Plate Screw,
4 Butt Plate Screw,
5 Tip,
6 Tip Screw,
7 Ramrod,
8 Ramrod Stop,
9 Barrel and Front Sight,
10 Upper Band,
11 Upper Band Spring,
12 Upper Band Swivel,
13 Upper Band Screw,
14 Lower Band,
15 Lower Band Spring,
20 Guard Swivel,
21 Guard Swivel Screw,
43 Rear Sight Base,
44 Rear Sight Base Screw,
45 Rear Sight Leaf,
46 Rear Sight Leaf Screw,
47 Rear Sight Leaf Slide,
48 Rear Sight Spring,
49 Rear Sight Leaf Joint Screw.

MILBANK, No. 51.



22 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

2 Stock.

ELEVEN *principal metallic parts not otherwise mentioned:*

15 Guard,
18 Trigger,
19 Trigger Bolt,
21 Receiver,
22 Extractor,
23 Breech Bolt,
26 Cam Lever,
28 Sear,
31 Firing Pin Section, Lower
32 Firing Pin Section, Upper
35 Firing Pin Washer.

THREE *Screws:*

16 Guard Screw,
17 Tang Screw,
25 Breech Bolt Locking Bolt Screw.

SIX *Pins:*

20 Trigger Pin,
24 Breech Bolt Stop Pin,
27 Cam Lever Stop Pin,
29 Sear Pin,
33 Firing Pin Section Pin,
34 Firing Pin Stop Pin.

ONE *Spring:*

30 Main Spring.

23 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
3 Ramrod,
4 Butt Plate,
5 Butt Plate Screw,
6 Butt Plate Screw,
7 Tip,
8 Tip Screw,
9 Upper Band, Swivel & Pin,
10 Upper Band Spring,
11 Middle Band,
12 Middle Band Spring,
13 Lower Band,
14 Lower Band Spring,
36 Rear Sight Base,
37 Rear Sight Base Screw,
38 Rear Sight Base Screw,
39 Rear Sight Spring,
40 Rear Sight Leaf,
41 Rear Sight Joint Pin,
42 Rear Sight Leaf Slide,
43 Rear Sight Leaf Screw.

LEE, No. 53.

LEE, No. 53.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—By drawing back the cam-lever, the pressure of its cam-shaped lower surface on the bottom of the receiver, raises the rear end of the breech-bolt, and with it a lug on its under surface from out of a notch in the receiver, with which it has hitherto been engaged. This allows the bolt to be drawn backward, to an extent determined by the striking of a stop-screw through the side of the receiver, against the end of a corresponding groove in the breech-bolt. In cocking the cam-lever a projection on its inner surface engages with a notch in the upper section of the firing-pin and draws it back against the tension of the surrounding mainspring. When fully compressed the firing-pin is caught and held by the sear, the cam-lever itself being free to move.

Closed and locked.—By pushing forward the bolt until it meets the barrel it engages with the receiver as before described, and keeps the breech closed and locked against the discharge.

Fired.—By the action of the mainspring as above described.

Extraction.—By an extractor which plays in the under surface of the breech-bolt and engages with the rim of the cartridge by its forward hooked end projecting beyond the face of the bolt.

Ejection.—By the lower side of the rearmost arm of the extractor, striking against the end of the groove in the receiver in which it slides, when the piece is fully opened. This throws upward its forward end on which the empty shell is resting.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK, WHICH SLIDES IN THE LINE OF THE BARREL BY DIRECT ACTION, *I. E., BOLT-GUNS,* HAVING—

2.—OUTSIDE LOCKS.

VAN CHOATE.

JOSLYN-TOMES.

MERRILL, NO. 83.

VAN CHOATE, No. 34.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—By first cocking the piece, then raising the handle of the breech-bolt to a vertical position, and then withdrawing the bolt until it is arrested by striking against the upper end of the recoil-screw. In raising the handle, the beveled surface on the head of the firing-pin bears against the tip of the recoil-screw, and thus positively retracts the firing-pin.

In withdrawing the bolt it rides over the hammer and presses it back to the full-cock.

Closed.—By reversing the motion of the bolt. The tip of the recoil-crew prevents the firing-pin from moving forward until the breech is fully closed.

Locked.—By the base of the bolt-handle falling into a mortise in the side of the receiver.

Fired.—By a center-lock of the usual pattern.

Extraction.—By a spring-hook on the side of the bolt.

Ejection.—By a sliding ejector playing in a groove in the bottom of the bolt, and, in the act ot withdrawing the bolt, struck forcibly against the tip of the recoil-screw. This throws the shell around the hook of the extractor by which it is held, and expels it completely from the gun.

NOTE.—The bolt cannot be moved unless the hammer is at the full-cock.

29 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

2 Stock.

TEN *principal metallic parts not otherwise mentioned:*

4 Receiver,
16 Hammer,
26 Breech Bolt,
27 Firing Pin,
5 Guard Plate,
9 Guard Bow,
14 Tang,
22 Trigger,
20 Main Spring Swivel,
31 Ejector.

ELEVEN *Screws:*

28 Firing Pin Screw,
19 Main Spring Screw,
6 Guard Screw,
7 Guard Screw,
8 Recoil Screw,
10 Guard Bow Nut,
11 Guard Bow Nut,
15 Tang Screw,
25 Trigger Spring Screw,
30 Extractor Screw,
32 Ejector Screw.

THREE *Pins:*

17 Hammer Pin,
21 Main Spring Swivel Pin,
23 Trigger Pin.

THREE *Springs:*

18 Main Spring,
24 Trigger Spring,
29 Spring Extractor.

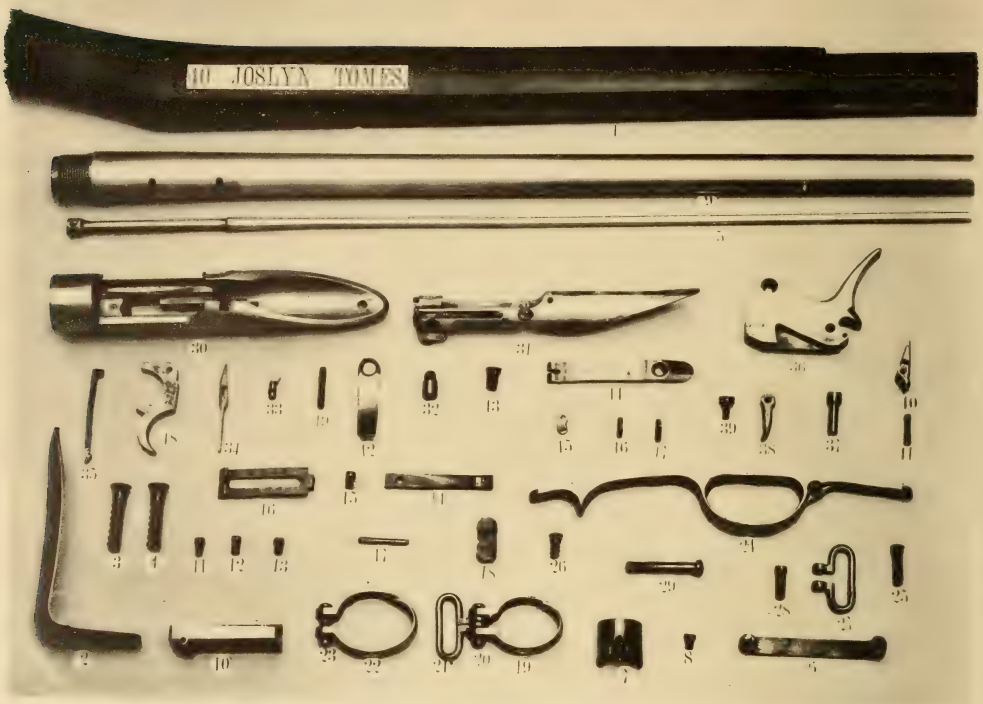
ONE *other minor part:*

2 Recoil Screw Bushing.

23 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
3 Ramrod,
12 Guard Plate Swivel,
13 Guard Plate Swivel Scr.,
39 Butt Plate,
40 Butt Plate Screw,
41 Butt Plate Screw,
42 Tip,
43 Tip Screw,
33 Upper Band,
34 Upper Band Spring,
35 Middle Band,
36 Middle Band Spring,
37 Middle Band Swivel,
38 Middle Band Swivel Scr.,
44 Rear Sight Base,
45 Rear Sight Leaf,
46 Rear Sight Leaf Slide,
47 Rear Sight Leaf Screw,
48 Rear Sight Spring,
49 Rear Sight Spring Screw,
50 Rear Sight Joint Screw.

VAN CHOATE, No. 34.



25 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

EIGHT *principal metallic parts not otherwise mentioned:*

30 Receiver,
36 Hammer,
38 Firing Pin,
40 Sear,
24 Guard Plate,
31 Breech Bolt,
45 Main Spring Swivel,
48 Trigger.

SIX *Screws:*

39 Firing Pin Screw,
43 Sear Spring Screw,
25 Guard Plate Scr., Upper
26 Guard Plate Scr., Lower
32 Breech Bolt Stop Screw,
29 Tang Screw.

SIX *Pins:*

37 Hammer Pin,
41 Sear Pin,
33 Breech Bolt Friction Pin,
46 Main Spring Swivel Pin,
47 Main Spring Swivel Pin,
49 Trigger Pin.

FOUR *Springs:*

42 Sear Spring,
34 Breech Bolt Friction Pin Spring,
44 Main Spring,
35 Spring Extractor.

25 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Butt Plate,
3 Butt Plate Screw,
4 Butt Plate Screw,
5 Ramrod,
7 Tip,
8 Tip Screw,
9 Barrel and Front Sight,
10 Rear Sight Base,
11 Rear Sight Base Screw,
12 Rear Sight Base Screw,
13 Rear Sight Base Screw,
14 Rear Sight Spring,
15 Rear Sight Spring Screw,
16 Rear Sight Leaf,
17 Rear Sight Joint Pin,
18 Rear Sight Leaf Slide,
19 Upper Band,
20 Upper Band Screw,
21 Upper Band Swivel,
22 Lower Band,
23 Lower Band Screw,
27 Guard Plate Swivel,
28 Guard Plate Swivel Scr.,
6 Ramrod Stop.

JOSLYN-TOMES, No. 40.

JOSLYN-TOMES, No. 40.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—By cocking the hammer. In so doing a hook-shaped shoulder on its forward portion is disengaged from a corresponding recess in the receiver, and the whole bolt, containing the hammer and lock, is free to move backward to its full extent. The firing-pin being linked to the hammer is also positively withdrawn from the face of the bolt.

Closed.—By reversing the motion of the bolt. It is held closed by a spring-catch (friction-pin) on its side.

Locked.—By the descent of the hooked portion of the hammer into the recess of the receiver when the piece is fired.

Fired.—By a back-action lock concealed in the bolt, the trigger alone being detached. The firing-pin descends with the hammer along an inclined groove in the face of the bolt leading to the site of the fulminate in the center of the cartridge-head.

Extraction.—By a spring-hook recessed in the side of the bolt, and riding over the rim of the cartridge when the piece is closed.

Ejection.—By the cartridge-shell being quickly withdrawn on two longitudinal guides, one on each side of the receiver, and ejected by the head striking first a stop on one guide, and then almost simultaneously a stop to the rear of the first on the other guide.

MERRILL, No. 83.

Four motions: Opened; loaded; closed; fired.

Opened.—By raising the handle of the breech-bolt to a vertical position and drawing it back to its full extent.

In raising the handle, the firing-pin is retracted by a lug near its head engaging with a spiral cam-recess in the receiver; it is held back by the lug entering a circumferential groove in the bolt. In withdrawing the bolt it passes over the hammer and presses it back to the full-cock.

Closed.—By reversing the movement of the bolt. At the end of the forward stroke, the point of the extractor engages with a recess in a ring which surrounds the mouth of the chamber, and against which the bolt is pressed, and turns the ring with it; so that the rotation of the bolt in locking will not cause it to grind against the head of the cartridge.

Locked.—In turning down the handle the piece is locked by the engaging of a sectional collar on the bolt with a corresponding groove in the receiver. When this is accomplished the lug on the firing-pin is opposite the deepest part of the spiral recess and is free to move forward when the piece is fired.

Fired.—By a center-lock moved by a double mainspring.

Extraction.—By a spring-hook lying on top of the breech-bolt.

Ejection.—In drawing back the bolt, the natural spring of the extractor presses down the rim of the cartridge upon the bottom of the receiver, until it is checked by striking against a notch left there for that purpose, and is thereby thrown upward around the hook of the extractor and clear of the gun.

27 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

TEN *principal metallic parts not otherwise mentioned:*

15 Chamber Ring,
16 Guard Plate,
17 Guard Bow,
22 Trigger,
24 Hammer,
31 Tang,
34 Breech Bolt,
35 Receiver,
37 Firing Pin Stop,
41 Firing Pin.

ELEVEN *Screws:*

18 Guard Bow Nut,
19 Guard Bow Nut,
23 Trigger Screw,
25 Hammer Screw,
26 Guard Screw, Upper
28 Guard Screw, Lower
30 Recoil Screw,
32 Tang Screw,
36 Breech Bolt Stop Screw,
39 Spring Extractor Screw,
40 Breech Bolt Locking Scr.

THREE *Springs:*

33 Main Spring,
38 Spring Extractor,
47 Barrel Chamber Ring Spr.

TWO *other minor parts:*

27 Upper Guard Scr'w Thimble,
29 Lower Guard Scr'w Thimble.

21 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Tip,
3 Tip Screw,
4 Butt Plate,
5 Butt Plate Screw,
6 Butt Plate Screw,
7 Ramrod,
8 Ramrod Stop,
9 Lower Band,
10 Lower Band Swivel,
11 Lower Band Screw,
12 Upper Band,
13 Upper Band Spring,
14 Barrel and Front Sight,
20 Guard Bow Swivel,
21 Guard Bow Swivel Scr.,
42 Rear Sight Base,
43 Rear Sight Base Screw,
44 Rear Sight Long Leaf,
45 Rear Sight Short Leaf,
46 Rear Sight Joint Screw.

MERRILL, No. 83.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK WHICH, SLIDES IN THE LINE OF THE BARREL BY INDIRECT ACTION, *I. E.*, MOVED BY LEVERS FROM—

1.—ABOVE.

BARNEKOV-GREENE.

BARNEKOV-GREENE.

This arm was withdrawn without being photographed or examined with sufficient closeness for an accurate description of its working. There was a short sliding block, back of which was a pair of links, secured at their forward end to the block, and in rear to the frame. The rearmost one of them contained the hammer, in cocking which the combination was bent upward, and so withdrew the block.

The cartridge-shells when extracted dropped through a hole left for the purpose in the frame.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK, WHICH SLIDES IN THE LINE OF THE BARREL BY INDIRECT ACTION, *I. E.*, MOVED BY LEVERS FROM—

2.—BELOW.

WINCHESTER.

STETSON.

BURGESS.

ALFRED BEALS, No. 49.

RUMSEY.

WINCHESTER MAGAZINE-ARM, No. 78.

Three motions as a repeater; four motions as a single-loader, viz: Opened; closed; fired—or opened; loaded; closed; fired.

Opened.—By the first motion of depressing the lever its upper arm draws back the breech-bolt by means of a pair of links, one end of which is connected with the bolt and the other end with the receiver.

In an interior groove in the rearmost of the links a transverse pin on the lever arm plays back and forth, closing and extending the pair as the breech is opened and closed. As the bolt is drawn backward it presses against the face of the hammer and brings it to the full-cock. A lever hung on the same pin as the forward link engages meanwhile with a notch in the firing-pin and positively retracts it from the face of the bolt.

As the motion of the lever is continued, a projection on its front surface strikes the under side of the carrier-lever near their common center of motion, and raises it with the carrier at its remote forward end, until the cartridge which the latter contains is exactly opposite the chamber of the piece. A friction-spring bearing upon the hub of the carrier-lever then falls into a notch, and holds it in position after the support of the lever has been withdrawn.

Closed.—By the first part of the motion of returning the lever to its former position, the transverse pin in its upper arm extends the pair of links, carrying the bolt forward against the cartridge and pressing it into the chamber. As the closing of the lever is continued, the striking of its upper arm upon the carrier-lever, throws down the carrier opposite the magazine, where it is supplied with a fresh cartridge by the action of the magazine-spring.

Locked.—By the support afforded the bolt by the links, the middle joint of which, when they are extended, is in line with the points of reception and transmittal of the strain.

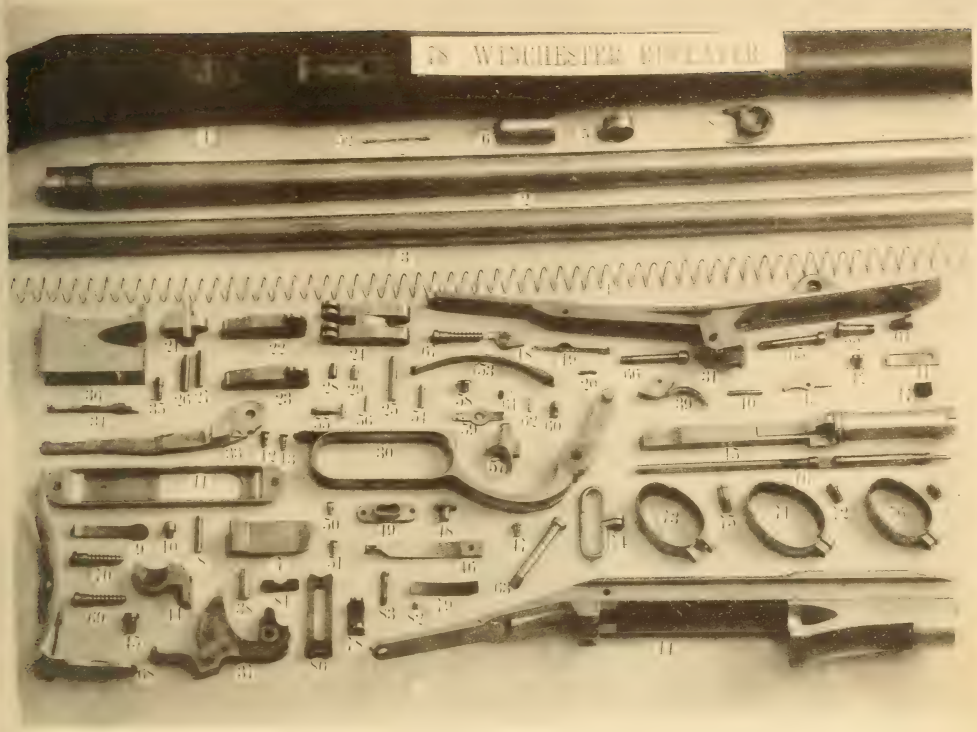
Fired.—By a center-lock of the usual pattern, the firing-pin passing completely through the bolt.

A secondary or safety sear, to prevent the firing of the piece before the breech is closed, blocks the trigger, by passing behind it through the guard-strap, while the lever is down. As the lever is closed, a projection on its upper surface pushes the safety sear out of the way of the backward movement of the trigger, and allows the piece to be fired.

Extraction.—By a spring-hook on top of the bolt, riding over the rim of the cartridge as the piece is closed, and nipping the cartridge-head between it and a notched-stud on the under side of the face of the bolt.

Ejection.—By the rising of the carrier as the empty shell is withdrawing, it strikes it from below, turns it around the extractor, by which it is held, and throws it clear of the gun.

The magazine is charged through a hole in the side of the stock, covered by a swinging lid and communicating with the mouth of the tube through the trough of the carrier. Through this opening into the carrier, the cartridge is also passed when the piece is used as a single-loader; the magazine, if charged, being cut off and held in reserve by a stop which is brought within the limits of the magazine by the passage of the inclined plane into which its lower surface is formed over a transverse pin below it. The stop is moved and kept in place by an external thumb-piece.



68 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

TWENTY-FIVE *principal metallic parts not otherwise mentioned:*

3 Magazine,
5 Magazine Spring Stop,
6 Magazine Follower,
7 Loading Lid,
11 Loading Lid Plate,
14 Receiver,
15 Breech Bolt,
16 Firing Pin,
18 Firing Pin Retractor,
21 B. Bolt Link Hinge Piece,
22 Breech Bolt Link,
23 Breech Bolt Link,
24 Breech Bolt Link,
30 Lever,
31 Lever Plate,
33 Carrier Lever,
36 Carrier,
37 Hammer,
39 Trigger,
43 Safety Sear,
48 Magazine Cut-off Thumb Piece,
49 Magazine Cut-off Plate,
55 Main Spring Swivel,
57 Lever Catch,
84 Magazine Cap.

SEVENTEEN *Screws:*

10 Loading Lid Spring Scr.,
12 Loading Lid Plate Screw,
13 Loading Lid Plate Screw,
17 Firing Pin Stop Screw,
32 Guard Screw,
35 Carrier Lever Spring Scr.
42 Trigger Spring Screw,
45 Charging Guide Screw,
47 Magazine Cut-off Screw,
50 Magazine Cut-off Plate Screw,
51 Magazine Cut-off Plate Screw,
58 Lever Catch Screw,
63 Tang Screw,
64 Lever Plate Screw, Upper
65 Lever Plate Screw, Middle
66 Lever Plate Screw, Middle
67 Lever Plate Screw, Lower

FOURTEEN *Pins:*

8 Loading Lid Pin,
20 Spring Extractor Pin,
25 Breech Bolt Link Hinge Piece Pin,
26 Breech Bolt Link Pin,
27 Breech Bolt Link Pin,
28 Breech Bolt Link Pin,
29 Breech Bolt Link Pin,
38 Hammer Pin,
40 Trigger Pin,
52 Magazine Cut-off Guide Pin,
54 Main Spring Pin,
56 Main Spring Swivel Pin,
60 Lever Catch Pin,
62 Lever Catch Pin Stop Pin.

NINE *Springs:*

4 Magazine Spring,
9 Magazine Cover Pin Spr.,
19 Spring Extractor,
34 Carrier Lever Spring,
41 Trigger Spring,
46 Magazine Cut-off Spring,
53 Main Spring,
59 Lever Catch Spring,
61 Lever Catch Pin Spring.

TWO *other minor parts:*

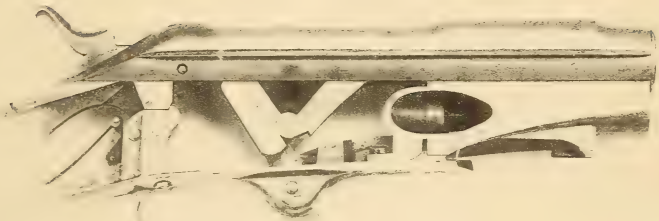
44 Charging Guide,
44 Charg. Guide Dowel Pin.

18 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Barrel and Front Sight,
68 Butt Plate,
69 Butt Plate Screw,
70 Butt Plate Screw,
71 Lower Band,
72 Lower Band Screw,
73 Middle Band,
74 Middle Band Swivel,
75 Middle Band Screw,
76 Upper Band,
77 Upper Band Screw,
78 Rear Sight Base,
79 Rear Sight Spring,
80 Rear Sight Leaf,
81 Rear Sight Leaf Slide,
82 Rear Sight Leaf Screw,
83 Rear Sight Joint Screw.

WINCHESTER, No. 78.

78 WINCHESTER REPEATER.



As a single-loader.—In this case, with the exception of the loading, which is done through the side before the piece is opened, or through the top of the receiver when the bolt is drawn back, the motions are the same as when using the magazine.

The ammunition used in this arm was ignited by the Milbank primer, in which the fulminate is contained in a small tube passed through the head of the cartridge and having its outer end conically recessed, so as to protect the fulminate from accidental ignition in the magazine by impact from the cartridge lying next below it. When fired, the point of the firing-pin enters this cavity and wedges the fulminate around it against the external walls of the primer, in this way causing the explosion.

STETSON MAGAZINE, NO. 52.

Withdrawn without affording an opportunity for photographing.

This arm resembles externally, in its operation and in many of its features, the Winchester, No. 78.

Locked.—It is locked in the act of closing the lever-guard, by a projection on the bolt being thrown upward in front of a shoulder in the upper portion of the frame.

Ejection.—The empty shells are ejected through the same lateral opening by which the magazine is charged. It is provided with a cut-off for the magazine, by which it can be reserved for an emergency while the arm is being used as a single-loader.

BURGESS MAGAZINE.

This arm was merely exhibited to the Board, not even being fired in their presence and no photograph was taken. A short breech-block slides to and from the end of the barrel by means of a solid lever, the forward upper corner of the body of which, is jointed to the back of the block. When the piece is closed, the body of the lever abuts against the back of the slot in the frame in which the block moves. Its lower portion is drawn out into a tang of the usual form, which, besides serving as a trigger-guard, is so shaped in front that in opening the piece it forms a constant fulcrum against the front of the slot in which it moves in the lower side of the frame. By means of this support and of its connection with the breech-block, it can thus withdraw it, cocking a central hammer as it moves. A magazine is carried beneath the barrel, from which the cartridges are fed into a carrier of the usual form.

The extracting and ejecting apparatus are like those usually found in bolt-guns.

A. C. BEALS, No. 49.

Wooden Model.

Five motions, viz: Opened; loaded; full-cocked; fired.

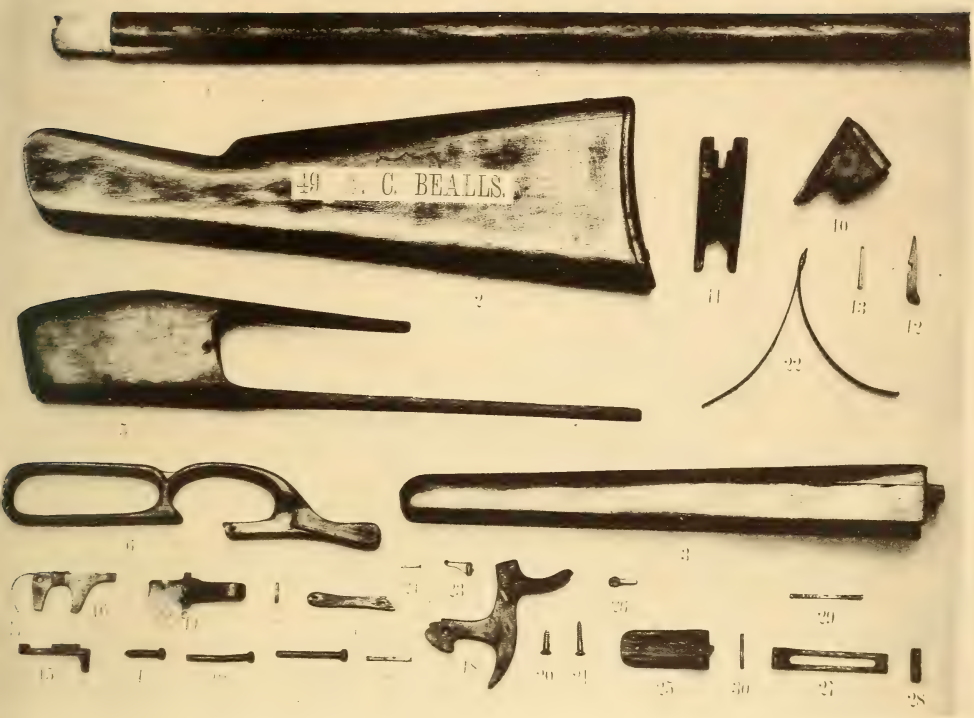
Opened.—By depressing the lever; this brings down the rearmost of two folding-wedges which form the breech-block, by means of a toggle or link, and at the same time withdraws the upper section of the block to its full extent and then drops it out of the way of the cartridge. The hammer is simultaneously brought to the half-cock.

Closed.—By reversing the action of the lever the sections the block are brought into place, the last movement of the upper section being in the line of the barrel, thus tending to press the cartridge into the chamber if it be not already completely inserted.

Locked.—By the position of the breech-block.

Fired.—By a tang-lock of the usual pattern.

Extraction and Ejection.—By a sliding extractor on the side of the barrel, impelled backward by a spring, when by the descent of the breech-block the way for it is clear.



23 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Butt Stock,
3 Tip Stock.

ELEVEN *principal metallic parts not otherwise mentioned:*

5 Frame,
6 Lever,
7 Link,
10 Breech Block, Front Section,
11 Breech Block, Rear Section,
12 Firing Pin,
14 Trigger,
15 Extractor,
16 Ejector,
18 Hammer,
23 Main Spring Swivel.

THREE *Screws:*

19 Hammer Screw,
20 Tang Screw,
21 Tang Screw.

FIVE *Pins:*

8 Link Pin,
9 Link Pin,
13 Firing Pin Stop Pin,
14 Trigger Pin,
24 Main Spring Swivel Pin.

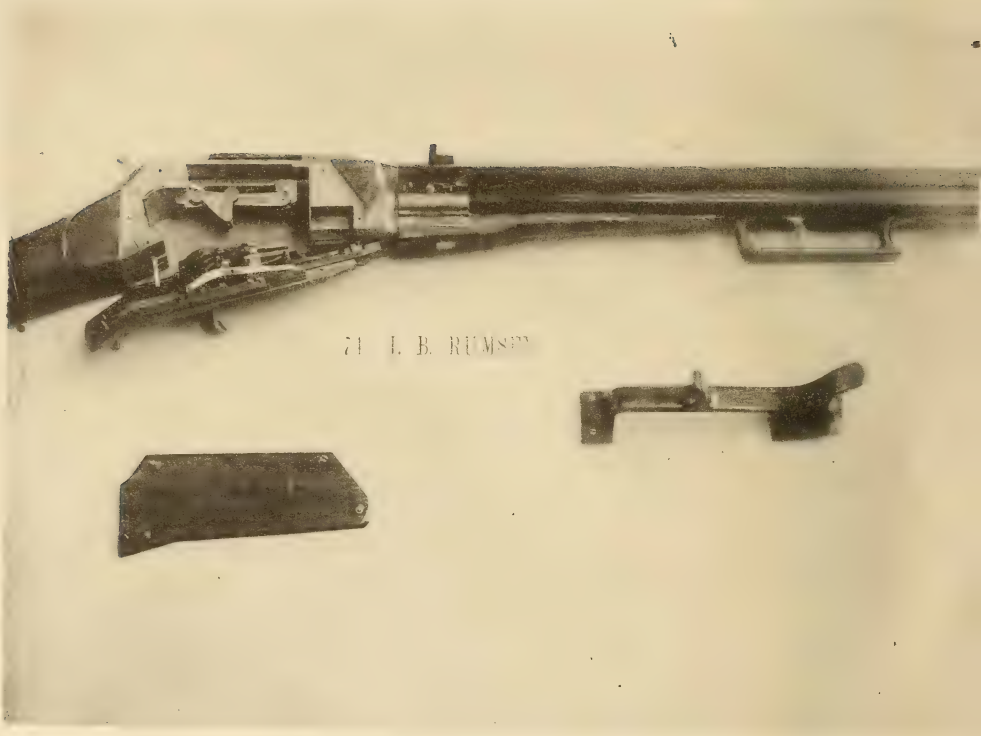
TWO *Springs:*

17 Ejector Spring,
22 Main Spring.

12 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
2 Butt Plate,
2 Butt Plate Screw,
2 Butt Plate Screw,
4 Tip Stock Screw,
25 Rear Sight Base,
26 Rear Sight Base Pin,
27 Rear Sight Leaf,
28 Rear Sight Leaf Slide,
29 Rear Sight Spring,
30 Rear Sight Joint Pin.

A. C. BEALS, No. 49.


71 E. B. RUMSEY

RUMSEY, No. 74.

Wooden model.

Resembles in its general features the Winchester arm. Its peculiarity consists in having two magazine-tubes, one on each side of the barrel and beneath it. From these the cartridges are fed alternately into the corresponding carriers, which are moved up and down by levers operated by a sliding-rod. This rod is drawn to and from the operator by two thumb-pieces, one of which, for the right hand, is within the trigger-guard, and the other lies along the barrel in a position readily accessible by the fingers of the left hand when supporting the piece in the natural position of firing. The mechanism for communicating this reciprocal motion to the carrier-levers, consists mainly of an oscillating lever lying between the other two, and its connections in the form of springs, stops, and pins, which are designed for directing the stroke on each of its sides alternately.

18 o

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK WHICH SLIDES AT 90° TO THE BARREL AND—

1.—VERTICALLY.

SHARPS.

SHARPS, No. 5.

Five motions, viz: Cocked; opened; loaded; closed; fired.

Opened.—By depressing the lever it draws down the breech-block from its position in rear of the barrel; the firing-pin as it moves, being retracted by a shoulder on its side passing through an inclined groove in the frame.

Closed.—By reversing the above.

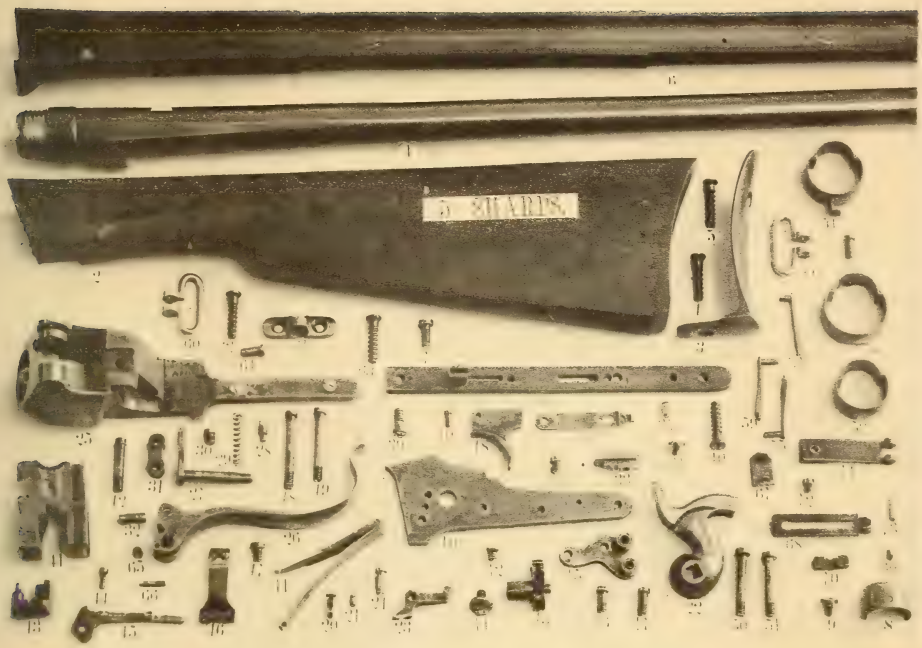
Locked.—By the position of the breech-block, which is held in place by the lever under the action of the lever-spring.

Fired.—By a back-action side-lock of the usual pattern.

Extraction.—By a bent lever pivoted below the chamber and struck by the downward movement of the breech-block in opening.

Ejection.—By accelerating the above by the action of the lever-spring, transmitted through the cam-like head of the lever to the block, and by it to the extractor.

NOTE.—This is the arm issued for experimental trial in the field.



49 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Butt Stock,
6 Tip Stock.

FIFTEEN *principal metallic parts not otherwise mentioned:*

10 Lock Plate,
13 Tumbler,
15 Bridle,
18 Trigger,
20 Main Spring Swivel,
22 Hammer,
23 Sear,
25 Frame,
26 Lever,
31 Link,
33 Lever Catch,
34 Guard Strap,
41 Breech Block,
43 Firing Pin,
45 Extractor.

TWENTY-ONE *Screws and Nuts:*

7 Recoil Stud Screw,
12 Main Spring Screw,
14 Tumbler Screw,
16 Bridle Screw,
17 Bridle Screw,
19 Trigger Screw,
21 Main Spring Swivel Scr.,
24 Sear Screw,
30 Hinge Pin Stop Screw,
32 Lever Link Screw,
34 Lever Catch Screw,
37 Lever Catch Spring Scr.,
39 Guard Strap Screw, Front
40 Guard Strap Screw, Rear
42 Breech Block Link Screw,
44 Firing Pin Screw,
47 Lever Spring Screw,
48 Side Screw, Front
49 Side Screw, Rear
50 Tang Screw, Front
51 Tang Screw, Rear

THREE *Pins:*

27 Hinge Pin,
35 Lever Catch Spring Pin,
66 Lever Friction Roll Pin.

FOUR *Springs:*

11 Main Spring,
29 Hinge Pin Stop Spring,
36 Lever Catch Spring,
46 Lever Spring.

FOUR *other minor parts:*

2 Side Screw Washer,
6 Recoil Stud Screw Washer,
28 Hinge Pin Stop,
65 Lever Friction Roll.

28 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel, Front Sight and Recoil Stud,
3 Butt Plate,
4 Butt Plate Screw,
5 Butt Plate Screw,
8 Tip,
9 Tip Screw,
52 Upper Band,
53 Upper Band Spring,
54 Middle Band,
56 Middle Band Swivel,
57 Middle Band Swivel Scr.,
55 Middle Band Spring,
58 Lower Band,
59 Lower Band Spring,
67 Rear Sight Base,
68 Rear Sight Leaf,
69 Rear Sight Leaf Screw,
70 Rear Sight Leaf Slide,
71 Rear Sight Spring,
72 Rear Sight Spring Screw,
73 Rear Sight Joint Pin,
60 Butt Stock Swivel,
61 Butt Stock Swivel Plate,
62 Butt Stock Swivel Plate Screw,
63 Butt Stock Swivel Plate Screw,
64 Butt Stock Swivel Screw.

SHARPS, No. 5.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK, WHICH ROTATES ABOUT AN AXIS PARALLEL TO THE AXIS OF THE BARREL AND—

1.—BELOW IT.

WERNDL.

WERNDL.—AUSTRIAN.

Five motions: Cocked; opened; loaded; closed; fired.

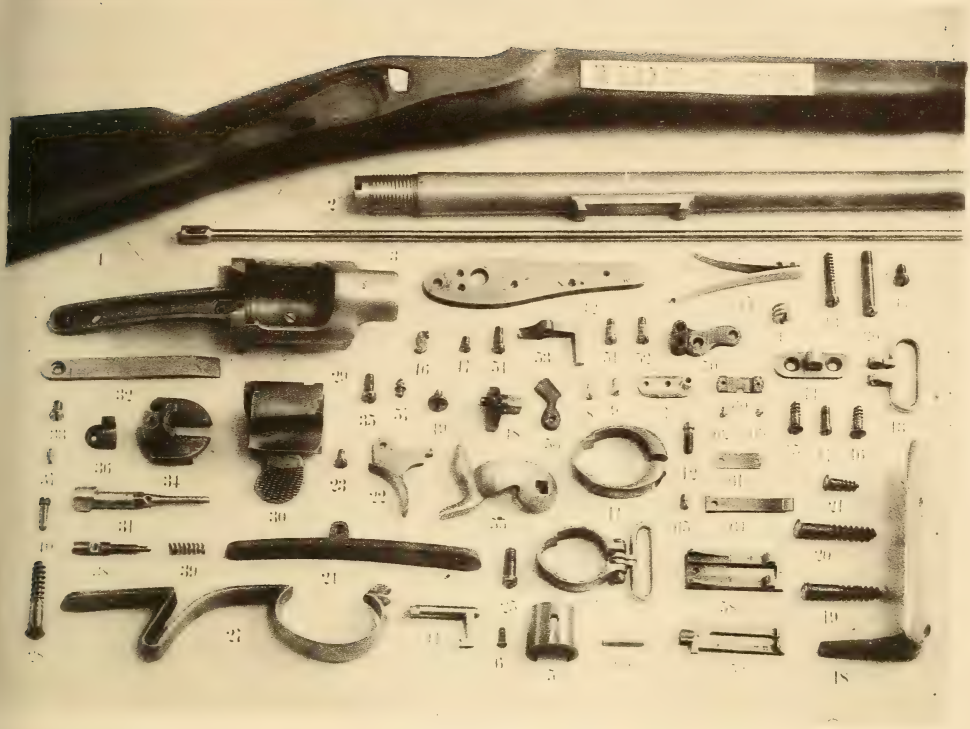
Opened.—By drawing back the nose of the hammer from the counterbore of the firing-pin hole, so as to allow the breech-block to be turned bottom-side upward by the handle on its side. This exposes a loading-groove, cut in the bottom of the breech-block, by which the cartridge may be inserted into the chamber. A V-shaped cam at the end of the rear journal of the base-pin, with which the block revolves, bears against a flat spring placed in the ordinary position of the tang of the breech-screw, and after passing the centers assists in opening and closing the piece.

Closed.—By reversing the movement of the block it is kept in place by the pressure of the spring above referred to on one of the faces of the cam.

Fired.—By a back-action side-lock of the usual pattern.

Extraction.—By what is essentially a bent lever pivoted below the mouth of the chamber, one arm of it playing by means of a stud on its inner surface within a helical groove in the periphery of the breech-block.

Ejection.—By the acceleration impressed on the block by the flat spring above referred to, when in opening the piece, the resistance of the spring is no longer directed toward the axis of revolution.



37 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

SIXTEEN *principal metallic parts not otherwise mentioned:*

22 Trigger,
24 Trigger Plate,
27 Guard Plate,
29 Receiver,
30 Breech Block,
31 Breech Block Base Pin,
34 Breech Block Cam Plate,
36 Breech Block Base Pin Guide,
38 Firing Pin,
41 Extractor,
42 Lock Plate,
46 Main Spring Swivel,
48 Tumbler,
50 Bridle,
53 Sear,
55 Hammer.

FIFTEEN *Screws:*

23 Trigger Screw,
25 Trigger Plate Screw,
26 Tang Screw,
28 Guard Plate Screw,
33 Breech Block Base Pin Spring Screw,
35 Breech Block Cam Plate Screw,
37 Breech Block Base Pin Guide Screw,
40 Firing Pin Stop Screw,
43 Lock Plate Screw,
44 Lock Plate Screw,
47 Main Spring Stop Screw,
49 Tumbler Screw,
51 Bridle Screw,
52 Bridle Screw,
54 Sear Screw.

THREE *Springs:*

32 Breech Block Base Pin Spring,
39 Firing Pin Spring,
45 Main Spring.

TWO *other minor parts:*

56 Hammer Pad, (Leather),
57 Hammer Pad Stud.

33 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Barrel and Front Sight,
3 Ramrod,
4 Ramrod Stop,
5 Tip,
6 Tip Screw,
7 Tip Screw Plate,
8 Tip Screw Plate Screw,
9 Tip Screw Plate Screw,
10 Upper Band, Swivel, Scr'w and Washer,
11 Lower Band,
12 Lower Band Screw,
13 Swivel,
14 Swivel Plate,
15 Swivel Plate Screw,
16 Swivel Plate Screw,
17 Swivel Plate Joint Screw,
18 Butt Plate,
19 Butt Plate Screw,
20 Butt Plate Screw,
21 Butt Plate Screw,
58 Rear Sight Base,
59 Rear Sight Leaf,
60 Rear Sight Leaf Slide,
61 Rear Sight Leaf Slide Cap,
62 Rear Sight Leaf Slide Cap Screw,
63 Rear Sight Leaf Slide Cap Screw,
64 Rear Sight Spring,
65 Rear Sight Spring Screw,
66 Rear Sight Joint Pin.

WERNDL, (AUSTRIAN).

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK, WHICH ROTATES ABOUT AN AXIS PARALLEL TO THE AXIS OF THE BARREL AND ON THE—

1.—RIGHT SIDE.

SNELL.

2.—LEFT SIDE.

EARNEST.

SNELL, Nos. 33 AND 62.

Four motions, viz: Opened; empty shell extracted; loaded; fired.

Opened.—By bringing the hammer to the full-cock.

Closed.—By firing the piece, the hammer falls behind the cartridge-head and is—

Locked.—By engaging in a groove in the frame.

Fired.—By a center-lock, the hammer striking a side-fire cartridge directly, by a projection near its outer edge.

Extraction.—By a sliding-piece operated independently by the hand, and serving to guard the cartridge against an accidental fall of the hammer while loading.

The friction-spring over the point of which the rim of the cartridge rides in loading, serves to keep the cartridge in the chamber while the hammer is cocked.

Gun No. 33 was withdrawn before being photographed.

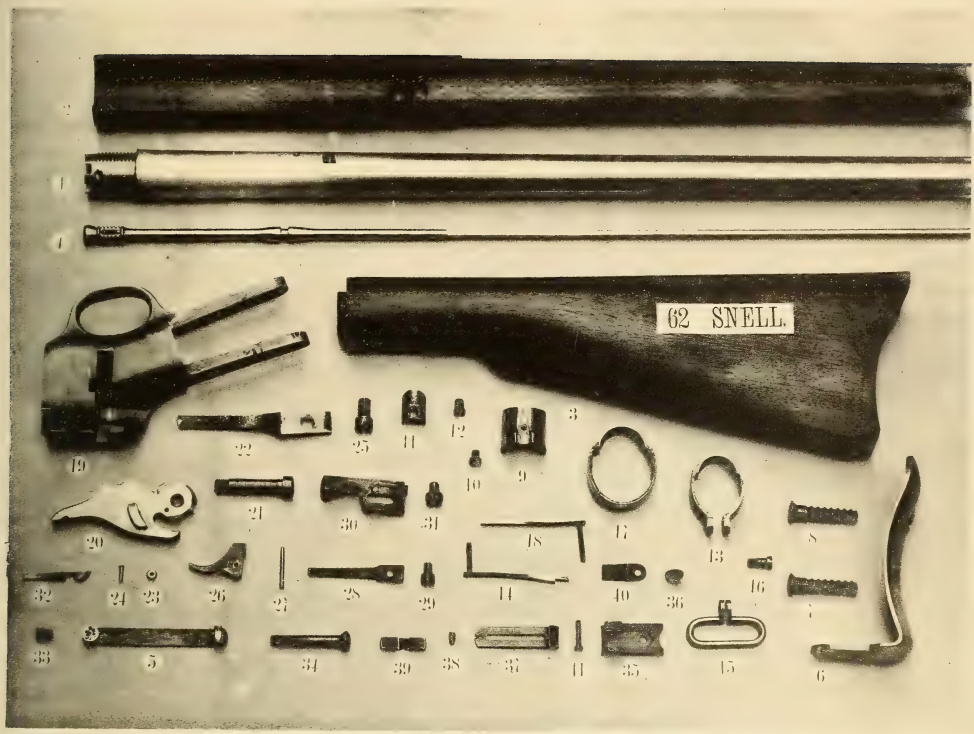
EARNEST, No. 65.

Withdrawn before being photographed.

This arm has a breech-block swinging on an axis parallel to that of the barrel, and to the left of it. The block is in two sections, the foremost of which revolves with a screw motion on that in rear, which alone is fastened to the hinge. They are both perforated for the firing-pin and striker. The forward section is provided with a handle by which the breech is opened and closed, receding from and approaching the barrel alternately.

The lock is peculiar, involving a device for causing the striker to rebound after delivering its blow upon the firing-pin.

The arm is especially designed to prevent the escape of gas from defective cartridges.



24 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

FIVE *principal metallic parts not otherwise mentioned:*

19 Frame,
20 Hammer,
20 Firing Stud,
26 Trigger,
30 Extractor.

SEVEN *Screws:*

12 Recoil Stud Screw,
21 Hammer Screw,
25 Main Spring Screw,
29 Trigger Spring Screw,
31 Extractor Screw,
33 Ejector Spring Screw,
34 Tang Screw.

THREE *Pins:*

24 Main Spring Friction Roll Pin,
27 Trigger Pin,
30 Extractor Spring Pin.

FOUR *Springs:*

22 Main Spring,
28 Trigger Spring,
30 Extractor Friction Spr'g,
32 Friction Spring.

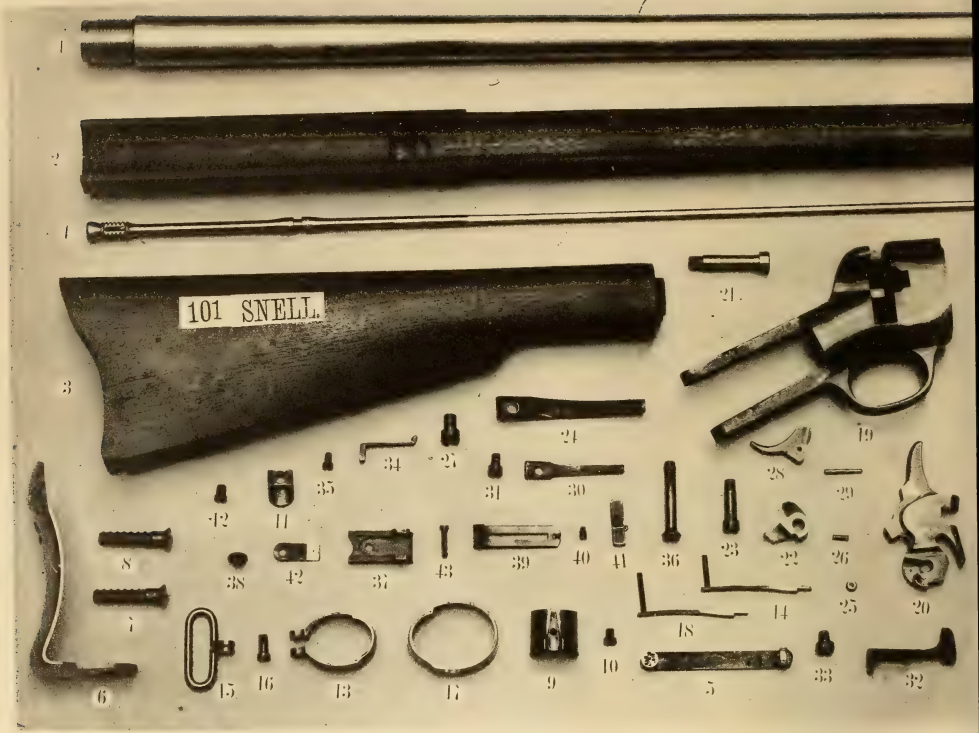
THREE *other minor parts:*

11 Recoil Stud,
11 Recoil Stud Dowel Pin,
23 Main Spring Friction Roll.

22 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
5 Ramrod Stop,
6 Butt Plate,
7 Butt Plate Screw,
8 Butt Plate Screw,
9 Tip,
10 Tip Screw,
13 Upper Band,
14 Upper Band Spring,
15 Upper Band Swivel,
16 Upper Band Screw,
17 Lower Band,
18 Lower Band Spring,
35 Rear Sight Base,
36 Rear Sight Base Screw,
37 Rear Sight Leaf,
38 Rear Sight Leaf Screw,
39 Rear Sight Leaf Slide,
40 Rear Sight Spring,
41 Rear Sight Joint Screw.

SNELL, No. 62.



23 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

SIX *principal metallic parts not otherwise mentioned:*

19 Frame,
20 Hammer,
22 Firing Pin,
28 Trigger,
32 Extractor,
34 Ejector.

SEVEN *Screws:*

12 Recoil Stud Screw,
21 Hammer Screw,
23 Firing Pin Screw,
27 Main Spring Screw,
31 Trigger Spring Screw,
33 Extractor Screw,
36 Tang Screw.

TWO *Pins:*

26 Main Spring Friction Roll Pin,
29 Trigger Pin.

THREE *Springs:*

24 Main Spring,
30 Trigger Spring,
35 Friction Spring.

THREE *other minor parts:*

11 Recoil Stud,
11 Recoil Stud Dowel Pin,
25 Main Spring Friction Roll.

22 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
5 Ramrod Stop,
6 Butt Plate,
7 Butt Plate Screw,
8 Butt Plate Screw,
9 Tip,
10 Tip Screw,
13 Upper Band,
14 Upper Band Spring,
15 Upper Band Swivel,
16 Upper Band Swivel Scr.,
17 Lower Band,
18 Lower Band Spring,
37 Rear Sight Base,
38 Rear Sight Base Screw,
39 Rear Sight Leaf,
40 Rear Sight Leaf Screw,
41 Rear Sight Leaf Slide,
42 Rear Sight Spring,
43 Rear Sight Joint Screw.

SNELL, No. 101.

SNELL, No. 101.

Four motions: Opened; empty shell extracted; loaded; fired.

This arm resembles generally No. 62, except that it is intended for a cen-er-fire cartridge, which is ignited by a firing-pin in the form of a bent ever, pivoted on the front and left side of the hammer. As the ham-ner falls, the forward arm of the firing-pin strikes the right side of the rame, and throws the left arm around to the front with sufficient force o ignite the cartridge; the striking of the forward arm of the firing-in on the frame, being so timed that the fulminate shall be ignited ust as the breech is closed.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK, ROTATING ABOUT A VERTICAL AXIS AT 90° TO THE AXIS OF THE BARREL, AND—

1.—LYING IN THE PLANE OF THE AXIS OF THE BARREL.

FREEMAN, No. 59.

FREEMAN, No. 76.

FREEMAN, No. 59.

Five motions, viz: Cocked; opened; loaded; closed; fired.

Opened.—By cocking the piece and pulling back the horn of the breech-block.

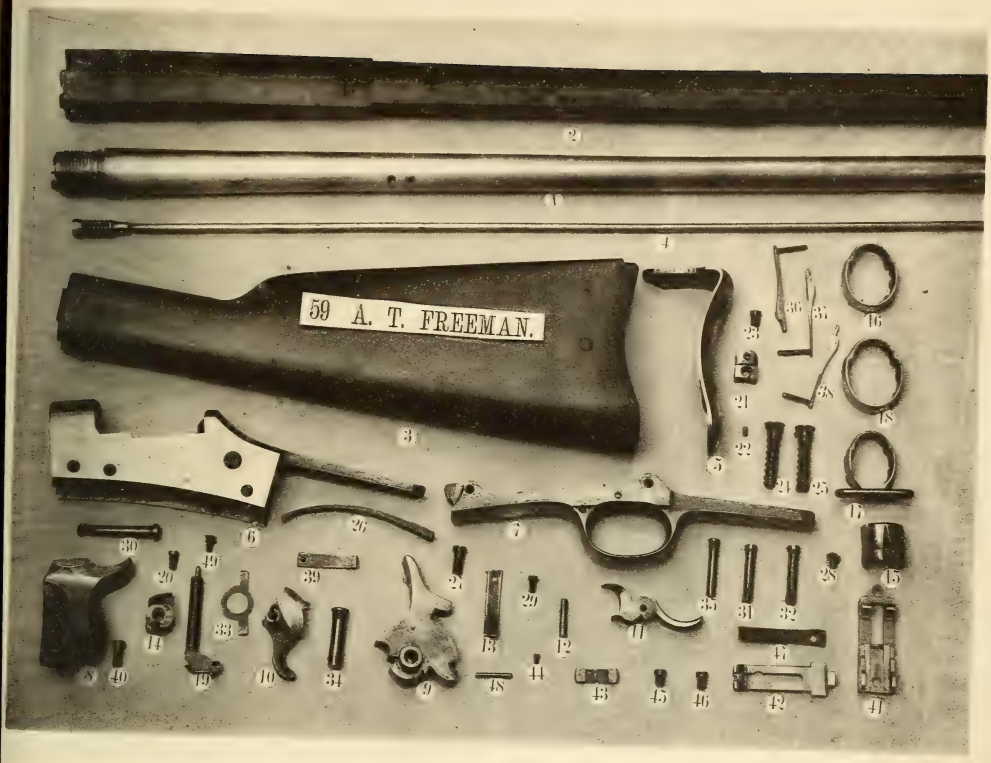
Closed.—By pushing the horn forward with the right hand, the bevel on the left face of the breech-block pushing the cartridge home.

Locked.—By the position of the breech-block, it is also kept from turning, by the front segment of the hammer engaging with a corresponding groove in the back of the block.

Fired.—By a center-lock of the usual pattern.

Extraction.—By a bent lever pivoted below the chamber and struck by the ejector-cam, which, turning with the breech-block in opening the piece, rides over the curved horn of the extractor and draws back its upper end, carrying with it the cartridge-shell.

Ejection.—By a flat spring riding on a cam formed on the hub of the extractor, and thereby accelerating its action on the cartridge-shell when the latter has been started from its seat in the chamber in the act of opening the piece.



28 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

EIGHT *principal metallic parts not otherwise mentioned:*

6 Frame,
8 Breech Block,
19 Firing Pin,
14 Extractor Cam,
9 Hammer,
10 Extractor,
7 Guard,
11 Trigger.

ELEVEN *Screws:*

20 Firing Pin Screw,
40 Breech Block Stud Scr.,
34 Hammer Screw,
35 Extractor Hinge Screw,
49 Ejector Spring Screw,
27 Main Spring Screw,
29 Trigger Spring Screw,
31 Guard Plate Screw,
32 Guard Plate Screw,
30 Tang Screw,
23 Recoil Stud Screw.

ONE *Pin:*

12 Trigger Pin.

FOUR *Springs:*

33 Br'ch Block Friction Sp'g,
39 Ejector Spring,
13 Trigger Spring,
26 Main Spring.

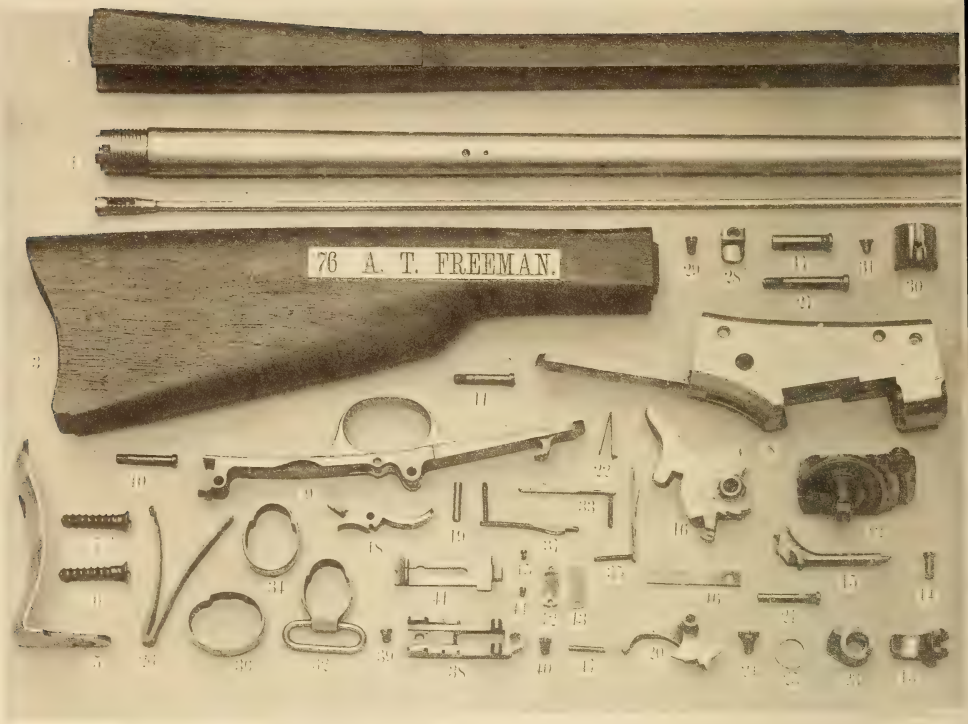
TWO *other minor parts:*

21 Recoil Stud,
22 Recoil Stud Dowel Pin.

26 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
5 Butt Plate,
24 Butt Plate Screw,
25 Butt Plate Screw,
15 Tip,
28 Tip Screw,
16 Upper Band, Swivel & Pin,
36 Upper Band Spring,
17 Middle Band,
37 Middle Band Spring,
18 Lower Band,
38 Lower Band Spring,
41 Rear Sight Base,
42 Rear Sight Leaf,
43 Rear Sight Leaf Slide,
44 Rear Sight Leaf Screw,
45 Rear Sight Base Screw,
46 Rear Sight Base Screw,
47 Rear Sight Spring,
48 Rear Sight Joint Pin,
7 Guard Swivel and Pin.

FREEMAN, No. 59.



25 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

NINE *principal metallic parts not otherwise mentioned:*

8 Frame,
9 Guard Plate,
12 Breech Block,
13 Br'ch Block Thumb Piece,
15 Firing Pin,
16 Hammer,
18 Trigger,
20 Extractor,
23 Extractor Cam.

EIGHT *Screws:*

10 Guard Screw,
11 Guard Screw,
14 Br'ch Block Thumb Piece Screw,
17 Hammer Screw,
21 Extractor Screw,
24 Extractor Cam Screw,
27 Tang Screw,
29 Recoil Stud Screw.

ONE *Pin:*

19 Trigger Pin.

THREE *Springs:*

22 Extractor Spring,
25 Extractor Cam Friction Spring,
26 Main Spring.

TWO *other minor parts:*

28 Recoil Stud,
28 Recoil Stud Dowel Pin.

26 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
5 Butt Plate,
6 Butt Plate Screw,
7 Butt Plate Screw,
30 Tip,
31 Tip Screw,
32 Upper Band,
33 Upper Band Spring,
34 Middle Band, Swivel and Pin,
35 Middle Band Spring,
36 Lower Band,
37 Lower Band Spring,
38 Rear Sight Base,
39 Rear Sight Base Screw,
40 Rear Sight Base Screw,
41 Rear Sight Leaf,
42 Rear Sight Leaf Slide,
43 Rear Sight Leaf Slide Cap,
44 Rear Sight Leaf Slide Cap Screw,
45 Rear Sight Leaf Slide Cap Screw,
46 Rear Sight Spring,
47 Rear Sight Joint Pin.

FREEMAN, No. 76.

FREEMAN, No. 76.

Differs from No. 59 mainly in the horn of the breech-block, which instead of being solid with the block, is pivoted to it on a vertical axis, and has its lower portion cam-shaped with a bearing on the side of the frame, so that a lever power is obtained in the first movement of opening the piece, when, if at all, the block is likely to stick.

The hammer also has a projecting tooth on its forward surface which engages with a notch in the under side of the firing-pin and retracts it when the hammer is cocked. The point of the firing-pin may thus be withdrawn from its impression in the cartridge-head, in order to allow the block to open freely.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK, ROTATING ABOUT A VERTICAL AXIS AT 90° TO THE AXIS OF THE BARREL, AND—

2.—NOT IN THE PLANE OF THE AXIS OF THE BARREL, (*ALL TO THE RIGHT AND IN FRONT.*)

MILBANK, No. 50.

BROUGHTON, No. 45.

MILBANK, No. 50.

No photograph of this gun was taken, and not enough of it was recalled to afford ground for a description of its working, except that it was provided with a breech-block, swinging sidewise and to the right.

BROUGHTON, No. 45.

Five motions, viz: Cocked; opened; loaded; closed; fired.

Opened.—By drawing back the firing-bolt to cock the piece, and pressing down on the thumb-piece to liberate a spring-catch in the breech-block from its notch in the receiver, and to allow the block to swing outward and forward until nearly parallel to the barrel.

Closed.—By shutting the block the spring-catch flies into place and holds the block from accidental opening until it is more securely locked.

Locked.—By the sliding backward to a solid bearing on the receiver, of the inner section of the breech-block under the influence of the discharge. It is still further secured by the entrance of the nose of the firing-bolt into the counterbore of the firing-pin hole, when the piece is fired.

Fired.—By a mainspring belonging to a lock, fastened on the guard-strap, throwing forward a tumbler which plays in a recess in the under side of the firing-bolt, and carrying it forcibly against the firing-pin.

Extraction.—By an extractor fixed on the joint-pin around which the block revolves, and struck by it above the center near the close of its movement in opening.

Ejection.—By a flat spring riding over a cam on the shaft of the extractor, and accelerating its movement after the center is passed.

NOTE.—The guard is connected with the receiver by an undercut groove in front and a spring-catch in rear, and, when detached from the gun, carries with it the lock complete.

36 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

2 Stock.

FIFTEEN *principal metallic parts not otherwise mentioned:*

7 Breech Block Latch,
7 Thumb Piece,
56 Breech Block, Inner Section,
10 Guard Catch,
53 Firing Pin,
4 Receiver,
5 Breech Block, Outer Section,
14 Guard,
17 Guard Catch,
21 Firing Bolt,
22 Trigger,
28 Tumbler,
18 Tang Screw Plate,
30 Extractor,
25 Main Spring Swivel.

TEN *Screws:*

9 Breech Block Latch Scr.,
11 Guard Catch Screw,
55 Firing Pin Screw,
15 Trigger Screw,
16 Guard Catch Screw,
27 Main Spring Screw,
29 Tumbler Screw,
32 Ejector Screw,
19 Tang Screw Plate Screw,
20 Tang Screw.

TWO *Pins:*

6 Breech Block Joint Pin,
26 Main Spring Swivel Pin.

FIVE *Springs:*

8 Br'ch Block Latch Spring,
54 Firing Pin Spring,
23 Trigger Spring,
24 Main Spring,
31 Ejector Spring.

THREE *other minor parts:*

2 Tang Screw Bushing,
4 Ejector Stud,
4 Ejector Spring Stud.

25 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
3 Ramrod,
33 Upper Band,
34 Upper Band Swivel,
35 Upper Band Screw,
36 Upper Band Spring,
37 Lower Band,
38 Lower Band Screw,
39 Lower Band Spring,
40 Butt Plate,
41 Butt Plate Screw,
42 Butt Plate Screw,
12 Tip,
13 Tip Screw,
45 Rear Sight Base,
46 Rear Sight Leaf,
47 Rear Sight Leaf Slide,
48 Rear Sight Leaf Slide Stop,
49 Rear Sight Leaf Slide Stop Screw,
50 Rear Sight Joint Pin,
51 Rear Sight Base Screw,
52 Rear Sight Spring,
43 Guard Swivel,
44 Guard Swivel Screw.

BROUGHTON, No. 45.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK, WHICH ROTATES ABOUT A HORIZONTAL AXIS AT 90° TO THE AXIS OF THE BARREL, LYING ABOVE THE AXIS OF THE BARREL, AND—

1.—IN FRONT.

SPRINGFIELD. (Various.)

BERDAN-RUSSIAN.

MORGENSTERN.

BROUGHTON, No. 79.

SPRINGFIELD, MODEL 1870, No. 48.

Five motions, viz: Cocked; opened; loaded; closed; fired.

Opened.—By half or full cocking the hammer, and then pressing on the thumb-piece of the cam-latch until the breech-block is free to swing upward and forward over the barrel.

Closed.—By shutting the block the latch flies into place under the influence of the cam-latch spring.

Locked.—By the horizontal elongation of the hinge-pin hole in the breech-block, allowing the block to slide bodily backward under the influence of the discharge. By this means and by the enlargement of the cam-shaft hole, a bearing in the line of the barrel is obtained by the interposition of the cam, which, abutting against the front surface of its recess in the block, transfers the recoil to the face of the breech-screw, without subjecting the shaft on which it turns to any strain.

Fired.—By a front-action side-lock of the usual pattern. The firing-pin guard on the thumb-piece, prevents an unexpected discharge of the piece, in case the hammer should fall, before the breech is securely closed.

Extraction.—By an extractor swinging on the hinge-pin, and struck above its center of motion by the forward end of the breech-block, near the completion of its movement in opening.

Ejection.—By accelerating the movement of the extractor by means of the spiral ejector-spring, which surrounds the stem of the ejector-spindle, and bears against the bottom of its hole in the receiver at one end, and against the head of the spindle at the other end. When the extractor is revolved by the opening of the block, the ejector-spring is compressed by the ejector-spindle, the point of which rests in a cavity in the back of the extractor above its axis of motion. The continued revolution of the extractor finally brings the prolongation of the ejector-spindle below the axis of motion; as soon as the center is passed, the sudden release of the ejector-spring causes the extractor to rapidly rotate about its axis, and to carry the empty cartridge-shell against the beveled surface of the ejector-stud, by which it is deflected upward and thrown clear of the gun.

NOTE.—This is the arm issued for experimental trial in the field.

44 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

EIGHTEEN *principal metallic parts not otherwise mentioned:*

18 Guard Plate,
19 Guard Bow,
22 Trigger,
45 Lock Plate,
57 Hammer,
53 Tumbler,
55 Bridle,
49 Sear,
6 Breech Block,
7 Breech Block Cap,
9 Cam Latch,
9 Thumb Piece,
10 Firing Pin,
4 Receiver,
5 Breech Screw,
17 Ejector Spring Spindle,
15 Extractor,
47 Main Spring Swivel.

FOURTEEN *Screws:*

34 Guard Screw,
35 Guard Screw,
20 Guard Bow Nut,
21 Guard Bow Nut,
23 Trigger Screw,
54 Tumbler Screw,
56 Bridle Screw,
50 Sear Screw,
52 Sear Spring Screw,
32 Side Screw,
33 Side Screw,
8 Breech Block Cap Screw,
12 Firing Pin Screw,
31 Tang Screw.

TWO *Pins:*

48 Main Spring Swivel Pin,
14 Hinge Pin.

FIVE *Springs:*

51 Sear Spring,
46 Main Spring,
13 Cam Latch Spring,
11 Firing Pin Spring,
16 Ejector Spring.

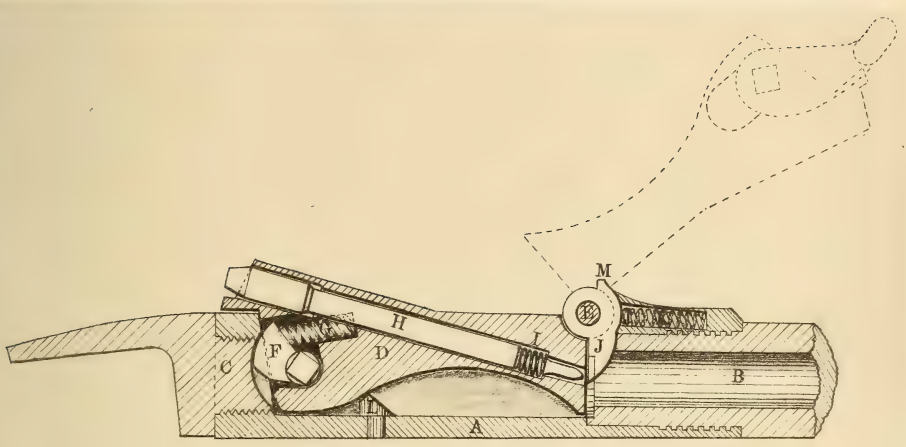
FOUR *other minor parts:*

4 Ejector Stud,
14 Hinge Pin Stud,
1 Side Screw Washer,
1 Side Screw Washer.

24 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

58 Butt Plate,
59 Butt Plate Screw,
60 Butt Plate Screw,
24 Lower Band,
37 Lower Band Spring,
25 Upper Band,
26 Upper Band Swivel,
27 Upper Band Swivel Scr.,
36 Upper Band Spring,
2 Ramrod,
28 Tip,
29 Tip Screw,
3 Barrel and Front Sight,
38 Rear Sight Base,
43 Rear Sight Base Screw,
44 Rear Sight Spring,
39 Rear Sight Leaf,
41 Rear Sight Leaf Slide,
40 Rear Sight Leaf Screw,
42 Rear Sight Joint Screw,
30 Ramrod Stop,
19 Guard Bow Swivel and Rivet.

SPRINGFIELD, No. 48.



No. 48.—SPRINGFIELD, MODEL 1870.

A. Receiver.
B. Barrel.
C. Breech Screw.
D. Breech Block.
E. Hinge Pin.
F. Cam Latch.
G. Cam Latch Spring.
H. Firing Pin.
M. Extractor Point.
I. Firing Pin Spring.
J. Extractor.
K. Ejector Spring.
L. Ejector Stud.

34 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

FIFTEEN *principal metallic parts not otherwise mentioned:*

23 Guard Plate,
26 Trigger,
29 Guard Bow,
35 Breech Block,
37 Firing Pin,
40 Cam Latch,
40 Thumb Piece,
40 Breech Block Cap,
34 Receiver,
43 Extractor,
45 Ejector Spring Spindle,
46 Lock Frame and Breech Screw,
47 Hammer,
53 Sear,
50 Main Spring Swivel.

EIGHT *Screws:*

24 Guard Screw, Upper
25 Guard Screw, Lower
27 Trigger Screw,
30 Guard Bow Nut,
31 Guard Bow Nut,
42 Breech Block Cap Screw,
51 Main Spring Swivel Scr.,
28 Tang Screw.

FIVE *Pins:*

38 Firing Pin Stop Pin,
36 Hinge Pin,
48 Hammer Pin,
52 Main Spring Stop Pin,
54 Sear Pin.

FOUR *Springs:*

39 Firing Pin Spring,
41 Cam Latch Spring,
44 Ejector Spring,
49 Main Spring.

ONE *other minor part:*

34 Ejector Stud.

24 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Barrel and Front Sight,
3 Butt Plate,
4 Butt Plate Screw,
5 Butt Plate Screw,
6 Tip,
7 Tip Screw,
8 Upper Band,
9 Upper Band Spring,
10 Upper Band Swivel,
11 Upper Band Swivel Scr.,
12 Lower Band,
13 Lower Band Spring,
14 Ramrod,
16 Rear Sight Base,
17 Rear Sight Base Screw,
18 Rear Sight Spring,
19 Rear Sight Leaf,
20 Rear Sight Joint Screw,
21 Rear Sight Leaf Slide,
22 Rear Sight Leaf Screw,
15 Ramrod Stop,
32 Guard Bow Swivel,
33 Guard Bow Swivel Scr.

SPRINGFIELD–STILLMAN, No. 66.

SPRINGFIELD-STILLMAN, No. 66.

Opened, closed, and locked, extraction and ejection, same as No. 48, Springfield, model 1870.

Fired.—By a lock altered mainly from the Sharps lock, and set in a prolongation of the tang of the breech-screw. The firing-pin screw is replaced by a stop-pin kept in place by the breech-block cap.

SPRINGFIELD-ALLIN, No. 68.

Opened, closed, and locked, extraction and ejection, same as No. 48, Springfield, model 1870, the cam-latch and thumb-piece being in one piece instead of being riveted together as in the service arm.

Fired.—By a center-lock, the mainspring of which lies under the receiver, being dovetailed into it at its forward end. The firing-pin screw is replaced by a stop-pin, which is kept in place by the breech-block cap.

32 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

THIRTEEN *principal metallic parts not otherwise mentioned:*

5 Receiver,
6 Lock Frame and Breech Screw,
8 Breech Block,
10 Hammer,
12 Trigger,
17 Cam Latch,
20 Breech Block Cap,
22 Firing Pin,
25 Extractor,
33 Guard Plate,
36 Guard Bow,
16 Main Spring Swivel,
27 Ejector Spring Spindle.

SIX *Screws:*

7 Tang Screw,
21 Breech Block Cap Screw,
34 Guard Screw,
35 Guard Screw,
37 Guard Bow Nut,
38 Guard Bow Nut.

FIVE *Pins:*

9 Hinge Pin,
11 Hammer Pin,
13 Trigger Pin,
18 Cam Latch Pin,
24 Firing Pin Stop Pin.

FIVE *Springs:*

14 Trigger Spring,
15 Main Spring.
19 Cam Latch Spring,
23 Firing Pin Spring,
26 Ejector Spring.

TWO *other minor parts:*

9 Hinge Pin Stud,
5 Ejector Stud.

24 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Barrel and Front Sight,
3 Ramrod,
28 Butt Plate,
29 Butt Plate Screw,
30 Butt Plate Screw,
31 Tip,
32 Tip Screw,
41 Upper Band,
42 Upper Band Swivel,
43 Upper Band Swivel Scr.,
44 Upper Band Spring,
45 Lower Band,
46 Lower Band Spring,
47 Rear Sight Base,
48 Rear Sight Base Screw,
49 Rear Sight Leaf,
50 Rear Sight Leaf Screw,
51 Rear Sight Leaf Slide,
52 Rear Sight Spring,
53 Rear Sight Joint Screw,
54 Ramrod Stop,
39 Guard Bow Swivel,
40 Guard Bow Swivel Screw.

SPRINGFIELD-ALLIN, No. 68.

45 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

EIGHTEEN *principal metallic parts not otherwise mentioned:*

15 Guard Plate,
19 Guard Bow,
24 Trigger,
33 Lock Plate,
34 Hammer,
35 Tumbler,
37 Bridle,
39 Sear,
51 Breech Block,
52 Breech Block Cap,
54 Cam Latch,
60 Firing Pin,
49 Receiver,
50 Breech Screw,
57 Extractor,
44 Main Spring Swivel,
54 Thumb Piece,
59 Ejector Spring Spindle.

FIFTEEN *Screws:*

16 Guard Screw,
17 Guard Screw,
20 Guard Bow Nut,
21 Guard Bow Nut,
25 Trigger Screw,
36 Tumbler Screw,
38 Bridle Screw,
40 Sear Screw,
42 Sear Spring Screw,
46 Main Spring Scr'w Bolster,
47 Side Screw,
48 Side Screw,
53 Breech Block Cap Screw,
62 Firing Pin Screw,
18 Tang Screw.

TWO *Pins:*

45 Main Spring Swivel Pin,
56 Hinge Pin.

FIVE *Springs:*

41 Sear Spring,
43 Main Spring,
55 Cam Latch Spring,
61 Firing Pin Spring,
58 Ejector Spring.

FOUR *other minor parts:*

49 Ejector Stud,
56 Hinge Pin Stud,
1 Side Screw Washer,
1 Side Screw Washer.

26 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Butt Plate,
3 Butt Plate Screw,
4 Butt Plate Screw,
5 Lower Band,
6 Lower Band Spring,
7 Upper Band,
9 Upper Band Swivel,
10 Upper Band Swivel Scr.,
8 Upper Band Spring,
11 Ramrod,
13 Tip,
14 Tip Screw,
26 Barrel and Front Sight,
27 Rear Sight Base,
28 Rear Sight Base Screw,
29 Rear Sight Spring,
30 Rear Sight Spring Screw,
31 Rear Sight Joint Screw,
32 Rear Sight Leaf, Cap and two Rivets,
12 Ramrod Stop,
22 Guard Bow Swivel,
23 Guard Bow Swivel Screw.

SPRINGFIELD, No. 69.

SPRINGFIELD, No. 69.

Operated in all respects like Springfield, No. 48, and differing from it only in having the lock-plate of uniform thickness, about one half that of No. 48, the mainspring bolster being replaced by a screw. The shape of the hammer and of the surrounding parts of the stock are changed, so as to promote economy of manufacture and ease of manipulation.

SPRINGFIELD, Nos. 88 and 89.

Like 69 in every respect, except as to the barrel, which is of caliber .45, and the other parts changed as a consequence of this alteration.

In No. 99 also the shape of the ejector-stud is modified, and a lining inserted into the receiver, with the intention of facilitating the introduction of the cartridges.

RUSSIAN-BERDAN, No. 57.

Five motions, viz: Cocked; opened; loaded; closed; fired.

Opened.—By drawing back the locking-bolt to its full extent, thereby cocking the piece, and then throwing the breech-block upward and forward by the handle on its side.

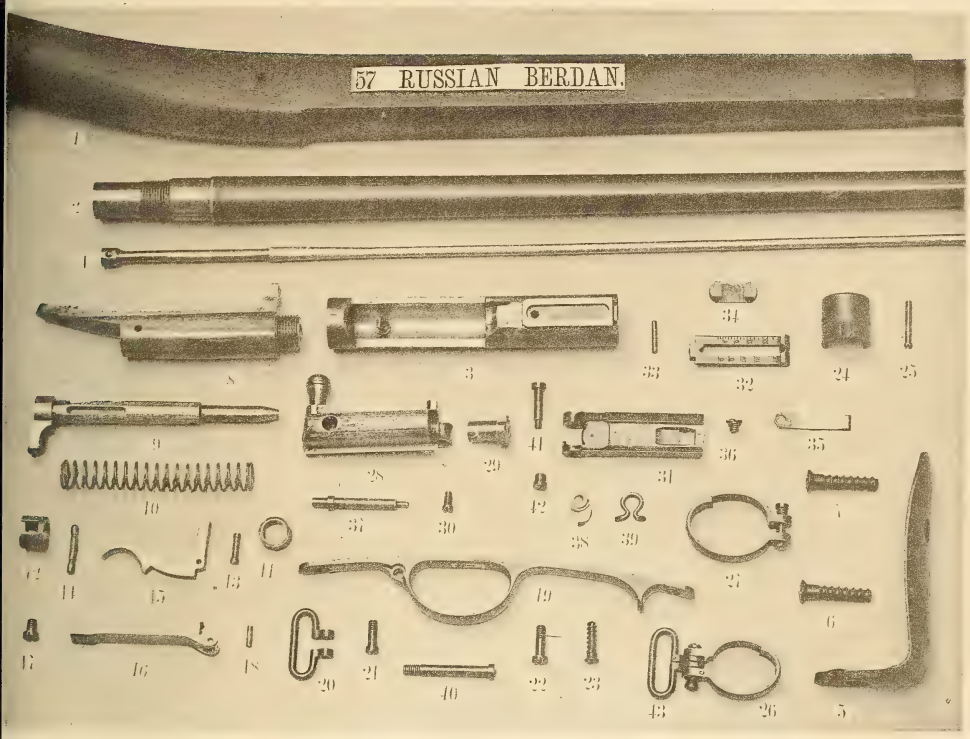
Closed.—By shutting the breech-block.

Locked.—By the friction of the rear face of the breech-block against the recoil-shoulder on the locking-bolt guide, against which the longitudinal motion of the hinge-strap slide, to which the block is attached, allows it bodily to slide under the influence of the discharge. It is also held in place by the entrance of the locking-bolt into the counterbore of the firing-pin hole when the piece is fired.

Fired.—In drawing back the locking-bolt to open the piece it compresses the spiral mainspring which surrounds it, and riding over the point of the spring-sear is caught by it and retained against the tension of the mainspring when the support of the hand is withdrawn. When released through the trigger in the usual way it is impelled against the firing-pin, and so discharges the piece.

Extraction.—By an extractor swinging on the joint-screw and struck above its center of motion by the forward end of the breech-block near the completion of its movement in opening.

Ejection.—By accelerating the movement of the extractor by the ejector-spring, one end of which has a solid bearing on the hinge-strap slide, and the other resting on the extractor above the center of motion, causes the spring to be compressed by the movement of the latter, until the direction of the resistance passes below the center of motion; the sudden release of the spring then throws out the extractor, carrying with it the shell, which in passing out is deflected by the beveled surface of the ejector-stud, and is thus thrown clear of the piece.



27 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

TEN *principal metallic parts not otherwise mentioned:*

3 Receiver,
9 Locking Bolt,
8 Locking Bolt Guide,
28 Breech Block,
29 Breech Block Section,
37 Firing Pin,
38 Extractor,
31 Hinge Strap Slide,
19 Guard Plate,
15 Trigger.

SEVEN *Screws:*

30 Br'ch Block Section Scr.,
41 Breech Block Joint Scr.,
42 Breech Block Joint Screw Nut,
22 Guard Plate Scr., Upper
23 Guard Plate Scr., Lower
17 Spring Sear Screw,
40 Tang Screw.

THREE *Pins:*

13 Main Spring Upper Stop Washer Pin,
14 Main Spring Lower Stop Washer Pin,
18 Trigger Pin.

THREE *Springs:*

16 Spring Sear,
10 Main Spring,
39 Ejector Spring.

THREE *other minor parts:*

3 Ejector Stud,
11 Main Spring Stop Washer, Upper,
12 Main Spring Stop Washer, Lower.

24 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Barrel and Front Sight,
4 Ramrod,
5 Butt Plate,
6 Butt Plate Screw,
7 Butt Plate Screw,
24 Tip,
25 Tip Screw,
26 Upper Band, Band Screw, and Washer,
27 Lower Band, Band Screw, and Washer,
43 Band Swivel,
34 Rear Sight Slide,
33 Rear Sight Joint Pin,
35 Rear Sight Spring,
36 Rear Sight Spring Screw,
1 Two Band Pins,
32 Rear Sight Leaf,
20 Guard Plate Swivel,
21 Guard Plate Swivel Scr.

RUSSIAN-BERDAN, No. 57.

20 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

2 Stock.

NINE *principal metallic parts not otherwise mentioned:*

4 Breech Block,
5 Section of Breech Block,
7 Firing Bolt,
10 Firing Pin,
3 Receiver,
11 Extractor,
13 Ejector Spring Spindle,
14 Trigger,
17 Guard.

FOUR *Screws:*

6 Breech Block Hinge Scr.,
18 Guard Screw,
19 Guard Screw,
22 Tang Screw.

ONE *Pin:*

15 Trigger Pin.

FOUR *Springs:*

8 Main Spring,
9 Trigger Spring,
12 Ejector Spring,
16 Trigger Spring,

ONE *other minor part:*

13 Ejector Spring Roll.

23 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
23 Ramrod,
24 Tip,
25 Tip Screw,
26 Butt Plate,
27 Butt Plate Screw,
28 Butt Plate Screw,
29 Upper Band,
30 Upper Band Screw & Nut,
31 Upper Band Swivel,
32 Lower Band,
33 Lower Band Screw and Nut,
34 Rear Sight Base,
35 Rear Sight Base Screw,
36 Rear Sight Base Screw,
37 Rear Sight Leaf,
38 Rear Sight Joint Pin,
39 Rear Sight Spring,
20 Guard Swivel,
21 Guard Swivel Screw.

MORGANSTERN, No. 15.

MORGENSTERN, No. 15.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—By drawing back the handle of the firing-bolt until the ribs on its sides are clear of the grooves in the receiver in which they slide. This cocks the piece by compressing the spiral mainspring which surrounds the firing-bolt, until it is caught and held by the sear lying in the bottom of the breech-block. The breech-block may be then thrown upward and forward until it is stopped by striking the front part of the receiver. It is held open there by the head of the ejector-spindle, which changes its bearing on the extractor so as, through it, to support the block.

Closed.—By reversing the movement of the breech-block. In shutting the breech-block down into place, the head of the firing-bolt rides over the beveled portion of the back of the receiver. This compresses the mainspring a little more, and causes it, when the block is well home, to draw the head of the firing-bolt slightly under the grooves by which it is afterward more fully locked. By this means the breech-block is kept from accidentally opening.

Locked.—By the side ribs of the firing-bolt engaging with the undercut grooves in the rear portion of the receiver.

Fired.—By a concealed spiral-spring lock, the firing-bolt being released by the action of the trigger within the receiver upon the sear within the block.

Extraction.—By the breech-block striking the lug on the extractor above its center of motion.

Ejection.—By the acceleration impressed on the extractor by the action of the ejector-spring on the ejector-spindle, when, by the motion of opening, the direction of this latter passes below the axis of the extractor. The ejector-spring is then released from the tension caused by its compression in opening, and causes the extractor to rapidly rotate about its axis, carrying the empty cartridge against the beveled shoulders of the receiver, by which it is deflected upward and thrown clear of the gun.

BROUGHTON, No. 79.

Five motions, viz: Cocked; opened; loaded; closed; fired.

Opened.—By cocking the piece so as to withdraw the nose of the hammer from the counterbore of the firing-pin hole, and then pressing forward the latch-lever, which passes through firing-pin, until the head of the pin is disengaged from the corresponding cavity in the receiver and the breech-block is free to swing upward and forward over the barrel.

Closed.—By shutting the block. The head of the firing-pin, which projects to the rear from the action upon it of the firing-pin spring, is forced forward by the striking of the bevel on its under surface against the receiver, and thus allows the block to come into place. When the head of the firing-pin comes opposite to its cavity in the receiver it is driven into it by the spring, and the breech is thereby—

Locked.—It is still further held by the entrance of the nose of the hammer into the mouth of the firing-pin hole when the piece is fired.

Fired.—By the action of a mainspring articulated into the bottom of the receiver in front, and moving a central lock of the usual form.

Extraction.—By an extractor swinging on the hinge-pin outside of the frame and struck above its center of motion by the front end of the breech-block near the completion of its movement.

Ejection.—By the acceleration impressed on the extractor by a bow-spring lying outside the barrel, the direction of the pressure of which, after the shell has been loosened and partly withdrawn by the extractor, passes below the center of motion on the pin, and by quickening its motion, drives the shell backward, until by striking the beveled surface of the ejector-stud, it is thrown clear of the gun.

28 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

TEN *principal metallic parts not otherwise mentioned:*

16 Guard,
22 Trigger,
26 Receiver,
27 Hammer,
31 Main Spring Swivel,
33 Breech Block,
34 Latch Lever,
37 Extractor,
40 Hinge Pin Stop,
41 Firing Pin.

NINE *Screws:*

17 Guard Screw, Upper
18 Guard Screw, Lower
21 Tang Screw,
23 Trigger Screw,
25 Trigger Spring Screw,
29 Hammer Pin Screw,
35 Br'ch Block Thumb Piece Screw,
39 Ejector Spring Screw,
40 Hinge Pin Stop Screw.

THREE *Pins:*

28 Hammer Pin,
32 Main Spring Swivel Pin,
36 Hinge Pin.

FOUR *Springs:*

24 Trigger Spring,
30 Main Spring,
38 Ejector Spring,
42 Firing Pin Spring.

ONE *other minor part:*

26 Ejector Stud.

25 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Barrel and Front Sight,
3 Ramrod,
4 Butt Plate,
5 Butt Plate Screw,
6 Butt Plate Screw,
7 Tip,
8 Tip Screw,
9 Lower Band,
10 Lower Band Screw,
11 Lower Band Spring,
12 Upper Band,
13 Upper Band Swivel,
14 Upper Band Screw,
15 Upper Band Spring,
19 Guard Swivel,
20 Guard Swivel Screw,
43 Rear Sight Base,
44 Rear Sight Base Screw,
45 Rear Sight Base Screw,
46 Rear Sight Leaf,
47 Rear Sight Leaf Slide,
48 Rear Sight Leaf Screw,
49 Rear Sight Spring,
50 Rear Sight Joint Pin.

BROUGHTON, No. 79.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK, WHICH ROTATES ABOUT A HORIZONTAL AXIS AT 90° TO THE AXIS OF THE BARREL, LYING ABOVE THE AXIS OF THE BARREL AND IN REAR—

1.—MOVED FROM ABOVE.

ROBERTS.

ELLIOT, NOS. 24 AND 80.

WERDER.

SMOOT.

LEE, NO. 54.

LEE, NO. 61.

ROBERTS, No. 64.

Four motions, viz: Opened; loaded; cocked; fired.

Opened.—By raising the hooked catch-lever at the end of the tang of the breech-block out of its notch in the tang of the receiver. This depresses the forward end of the block so as to expose the chamber. The reaction of the breech-block spring lying beneath the block throws up the front of the block sufficiently to keep the cartridge from falling out of the chamber before the breech is fully closed.

Closed.—By returning the lever to its place, or automatically by cocking the piece. The back of the hammer in the latter case presses against the end of the slot in the tang of the breech-block in which it plays, and so raises the front of the block into place. In opening and closing the piece the knuckle-joint of the breech-block face allows it to recede from and approach the face of the cartridge, so that it may support the cartridge more nearly at right angles to the axis of the bore than if the block were in one piece and its lower edge lay close to the barrel when shut.

Locked.—By the position of the breech-block, which is also kept in place by the engaging of the hook of the catch-lever with a corresponding notch in the tang of the receiver.

Fired.—By a center-lock of the usual pattern.

Extraction and ejection.—By a bent lever pivoted to the side of the receiver below the chamber, and struck by the breech-block face in its descent.

30 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

TEN *principal metallic parts not otherwise mentioned:*

30 Breech Block,
31 Breech Block Face,
33 Firing Pin,
36 Catch Lever,
29 Receiver,
38 Hammer,
40 Trigger,
47 Extractor,
10 Guard Plate,
14 Guard Bow.

NINE *Screws:*

35 Firing Pin Screw,
43 Trigger and Breech Block Spring Screw,
45 Main Spring Screw,
48 Extractor Screw,
11 Guard Screw, Upper
12 Guard Screw, Lower
15 Guard Bow Nut,
16 Guard Bow Nut,
13 Tang Screw.

FIVE *Pins:*

37 Catch Lever Pin,
32 Hinge Pin,
39 Hammer Pin,
41 Trigger Pin,
44 Main Spring Friction Roll Pin.

FOUR *Springs:*

34 Firing Pin Spring,
42 Trigger and Breech Block Spring,
44 Main Spring,
46 Catch Lever Spring.

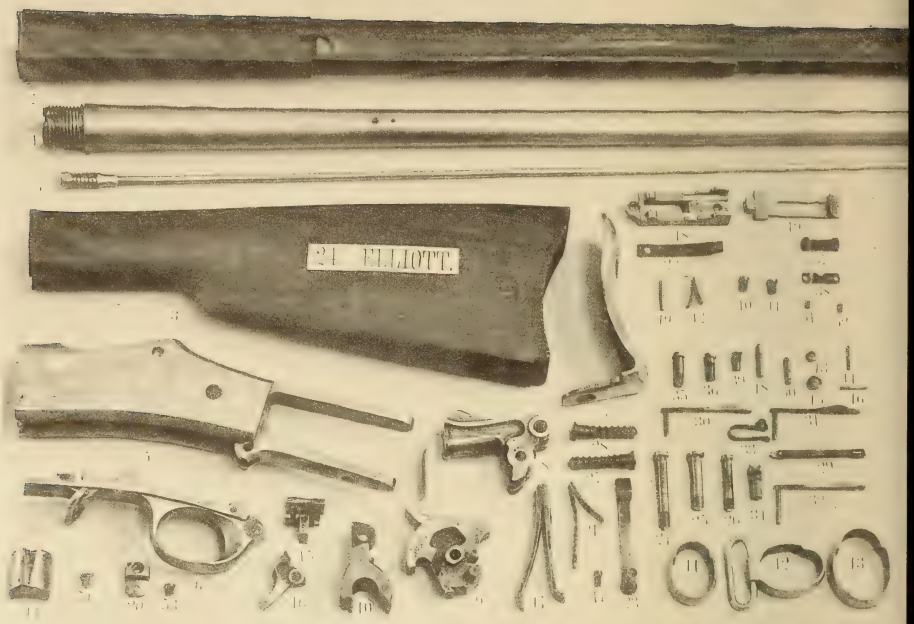
ONE *other minor part:*

44 Main Spring Friction Roll.

23 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Barrel and Front Sight,
3 Rear Sight Base,
4 Rear Sight Base Screw,
5 Rear Sight Spring,
6 Rear Sight Joint Screw,
7 Rear Sight Leaf,
8 Rear Sight Leaf Slide,
9 Rear Sight Leaf Screw,
19 Butt Plate,
20 Butt Plate Screw,
21 Butt Plate Screw,
22 Upper Band,
23 Upper Band Swivel,
24 Upper Band Swivel Scr.,
25 Upper Band Spring,
26 Lower Band,
27 Lower Band Screw,
28 Lower Band Spring,
49 Tip,
50 Tip Screw,
17 Guard Bow Swivel,
18 Guard Bow Swivel Screw.

ROBERTS, No. 64.



32 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

Two *of Wood:*

2 Tip Stock,
3 Butt Stock.

Ten *principal metallic parts not otherwise mentioned:*

8 Breech Block,
29 Firing Pin,
34 Firing Pin, Upper Section
5 Frame,
6 Guard,
15 Extractor,
16 Trigger,
23 Extractor Link,
9 Hammer,
10 Breech Block Pawl.

Eight *Screws:*

39 Main Spring Set Screw,
35 Rear Guard Screw,
36 Front Guard Screw,
47 Breech Block Pawl Spring Screw,
25 Hammer Screw,
26 Breech Block Screw,
24 Tang Screw,
53 Recoil Stud Screw.

Four *Pins:*

44 Extractor Friction Roll Pin,
48 Trigger Pin,
46 Main Spring Friction Roll Pin,
50 Ejector Spring Pin.

Four *Springs:*

33 Ejector Spring,
17 Main Spring,
42 Trigger Spring,
21 Br'ch Block Pawl Spring.

Four *other minor parts:*

43 Extractor Friction Roll,
45 Main Spring Friction Roll,
20 Recoil Stud,
20 Recoil Stud Pin.

27 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel,
4 Ramrod,
7 Butt Plate,
27 Butt Plate Screw,
28 Butt Plate Screw,
11 Upper Band,
30 Upper Band Spring,
12 Middle Band, Swivel and Pin,
31 Middle Band Spring,
13 Lower Band,
32 Lower Band Spring,
14 Tip,
54 Tip Screw,
18 Rear Sight Base,
19 Rear Sight Leaf,
37 Rear Sight Leaf Slide,
38 Rear Sight Leaf Slide Cap,
51 Rear Sight Leaf Slide Cap Screw,
52 Rear Sight Leaf Slide Cap Screw,
22 Rear Sight Spring,
49 Rear Sight Joint Screw,
40 Rear Sight Base Screw,
41 Rear Sight Base Screw,
6 Guard Swivel and Pin.

ELLIOT, No. 24.

ELLIOT, No. 24.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—By cocking the hammer it operates as a lever on the breech-block pawl, and at each movement alternately pushes and pulls against the lower arm of the breech-block and opens and closes the piece.

After opening the piece the hammer falls forward, and resting upon the pawl prevents any motion of the block until the piece is closed.

Closed.—By again bringing the hammer to the full-cock, where it is held by the sear end of the trigger. This motion is partly anticipated by the introduction of the cartridge, the rim of which catches on the lip of the extractor and through the consequent action of the ejector-spring and extractor-link transmitted through the breech-block pawl to the breech-block, throws the block up sufficiently to retain the cartridge in the chamber until the breech is fully closed.

Locked.—By the position of the breech-block and by its friction against the head of the cartridge when the piece is fired. It is also braced by the hammer falling behind a shoulder on the pawl, to prevent its movement as in opening.

Fired.—By the usual center-lock and a firing-pin in two sections, one of which moves with the block and the other remains in the frame.

Extraction.—By a lever pivoted below the chamber and worked through the intervening extractor-link by the movement of the hammer on the pawl.

Ejection.—By an auxiliary spring playing on friction-roller eccentrically placed in the extractor.

Remarks.—The guard is hinged at its rear end so as to afford a ready means of inspecting or cleaning the mechanism.

The lock is so constructed that the hammer cannot be let down slowly upon the firing-pin by the thumb.

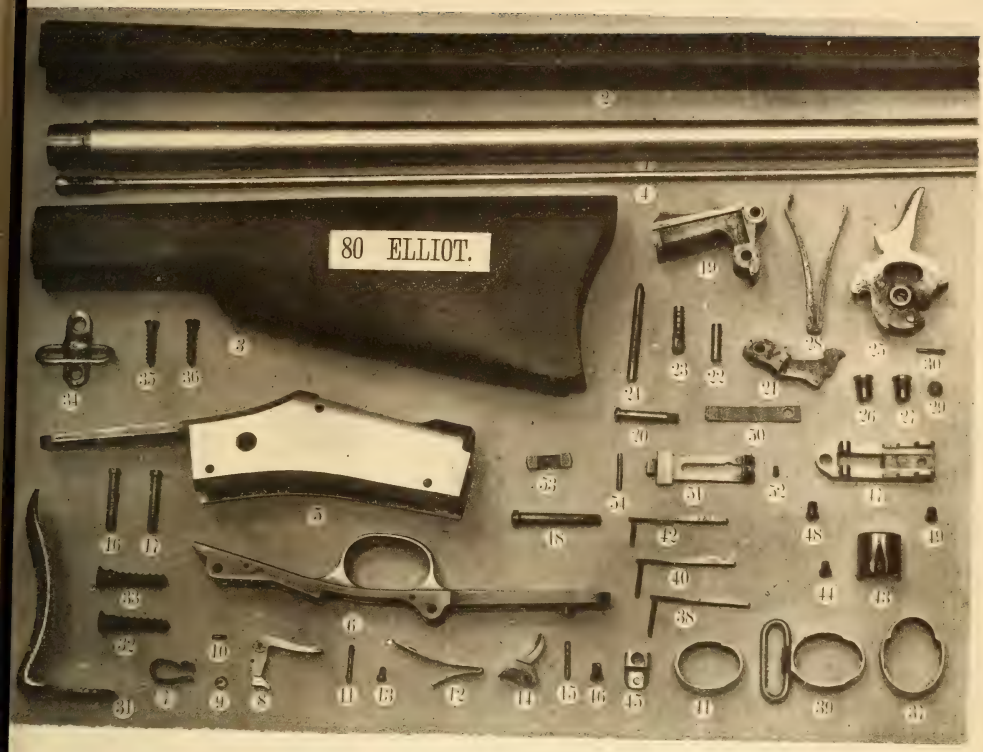
ELLIOT, No. 80.

Four motions, (as in No. 24.) Like No. 24, except in the extraction.

Extraction.—Is effected by a bent lever of the usual form, and operated by the descent of the breech-block.

The peculiarities of construction mentioned in remarks are also omitted.

The breech-block pawl in this arm is single, and works within the cheeks of a slit hammer. In No. 24 the hammer is single and there is a double pawl.



35 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

TEN *principal metallic parts not otherwise mentioned:*

5 Frame,
6 Guard Plate,
8 Extractor,
9 Ejector Spring Roll,
14 Trigger,
19 Breech Block,
21 Breech Block Pawl,
23 Firing Pin, Upper Section
24 Firing Pin, Lower Section
25 Hammer.

EIGHT *Screws:*

13 Br'ch Block Pawl Spring Screw,
16 Guard Screw,
17 Guard Screw,
18 Tang Screw,
20 Breech Block Screw,
26 Hammer Screw, Right
27 Hammer Screw, Left
46 Recoil Stud Screw.

NINE *Pins:*

6 Ejector Spring Pin,
6 Main Spring Stop Pin,
10 Ejector Spring Roll Pin,
11 Extractor Pin,
15 Trigger Pin,
22 Breech Block Pawl Pin,
25 Breech Block Pawl Stop Pin,
25 Breech Block Pawl Stop Pin,
30 Main Spring Friction Roll Pin.

THREE *Springs:*

7 Ejector Spring,
12 Breech Block Pawl Spr'g,
28 Main Spring.

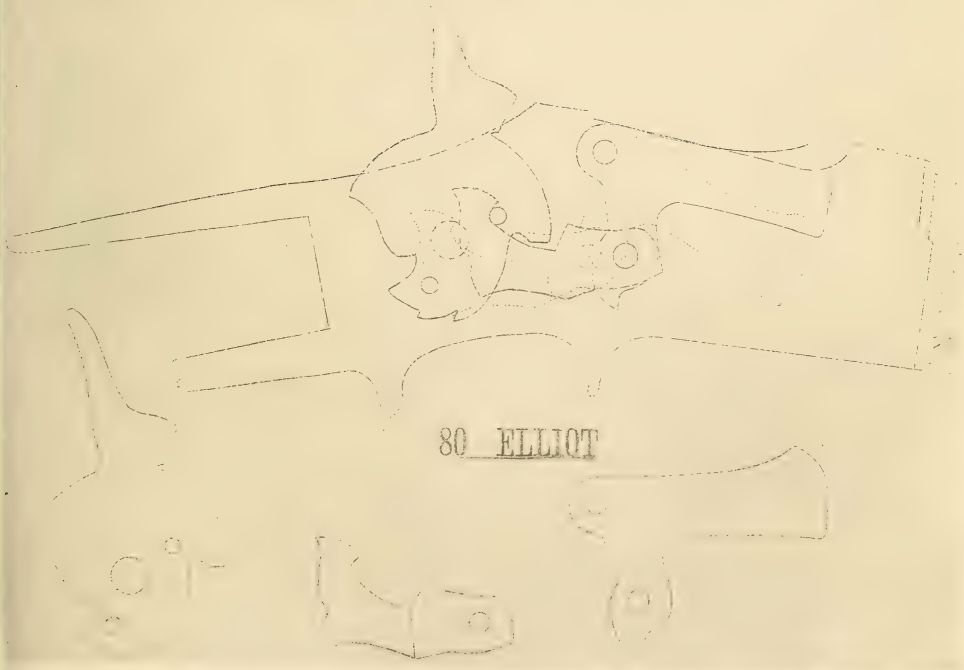
THREE *other minor parts:*

29 Main Spring Friction Roll,
45 Recoil Stud,
45 Recoil Stud Dowel Pin.

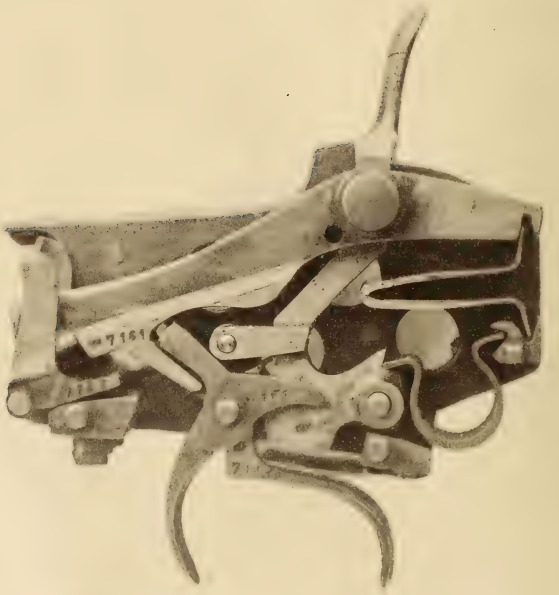
28 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel,
4 Ramrod,
31 Butt Plate,
32 Butt Plate Screw,
33 Butt Plate Screw,
34 Swivel Plate, Swivel and Pin,
35 Swivel Plate Screw,
36 Swivel Plate Screw,
37 Lower Band,
38 Lower Band Spring,
39 Middle Band, Swivel and Pin,
40 Middle Band Spring,
41 Upper Band,
42 Upper Band Spring,
43 Tip,
44 Tip Screw,
47 Rear Sight Base,
48 Rear Sight Base Screw,
49 Rear Sight Base Screw,
50 Rear Sight Spring,
51 Rear Sight Leaf,
53 Rear Sight Leaf Slide,
52 Rear Sight Leaf Screw,
54 Rear Sight Joint Pin.

ELLIOT, No. 80.


80 ELLIOT

WERDER.--Bavarian.



WERDER.--Bavarian.

31 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

ONE *of Wood:*

1 Stock.

TWELVE *principal metallic parts not otherwise mentioned:*

16 Receiver,
21 Guard,
22 Guard Plate,
28 Frame, Right Section
29 Frame, Left Section
30 Breech Block,
31 Firing Pin,
34 Extractor,
36 Hammer,
37 Trigger,
38 Locking Brace,
46 Hammer Friction Roll.

SIX *Screws:*

17 Receiver Stop Screw,
18 Receiver Stop Screw,
23 Guard Screw, Upper
24 Guard Screw, Lower
25 Tang Screw,
27 Recoil Screw.

FOUR *Pins:*

28 Hammer Pin,
28 Locking Brace Pin,
33 Firing Pin Stop Pin,
47 Hammer Friction Roll Pin.

FOUR *Springs:*

32 Firing Pin Spring,
35 Breech Block Spring,
49 Trigger Spring,
48 Main Spring.

FOUR *other minor parts:*

19 Receiver Stop Scr. Washer,
20 Receiver Stop Scr. Washer,
26 Tang Screw Thimble,
28 Main Spring and Ejector Spring Bolster.

29 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Barrel, Rear Sight Base, Front Sight and 2 Bayonet Studs,
3 Ramrod,
4 Butt Plate,
5 Butt Plate Screw,
6 Butt Plate Screw,
7 Lower Band,
8 Lower Band Spring,
9 Middle Band, Swivel and Pin,
10 Middle Band Spring,
11 Upper Band,
12 Upper Band Spring,
13 Swivel Plate, Swivel and Rivet,
14 Swivel Plate Screw,
15 Swivel Plate Screw,
39 Rear Sight Spring,
40 Rear Sight Spring Screw,
41 Rear Sight Leaf,
42 Rear Sight Leaf Slide,
43 Rear Sight Joint Pin,
44 Rear Sight Leaf Slide Wedge,
45 Rear Sight Leaf Slide Stop Screw.

WERDER, [BAVARIAN].

WERDER, BAVARIAN.

Four motions: Opened; loaded; closed; fired.

Opened.—By pressing forward the trigger of the locking-brace when ıe hammer is down. This releases the spur on the under surface of ıe breech-block from its bearing against the brace, so that the block is ee to open under the action of the breech-block spring. This spring resses upward its rearmost end, tending to throw the front end down ıto the position of loading. The block cannot be opened when the ammer is cocked, for a backward horn of the locking-brace is then ngaged over a stud on the lower side of the hammer, and is thus kept om moving backward in its usual way, while a lip on the back of the rward arm of the brace, by striking against the breech-block spur, keeps ıe brace from moving forward to release the block, in case that by any ccident the trigger of the locking-brace should be drawn back or jarred ut of place.

Closed.—By cocking the piece. The friction-roll, lying between the gs on each side of the hammer, strikes the under surface of the breech-locks and carries it up into place; the motion of the hammer meanwhile ompressing both main and block springs; and the locking-brace and igger under the influence of the trigger-spring falling into their proper ositions.

Locked.—When closed the piece is locked by the position of the block, nd also by the support given by the locking-brace.

Fired.—By the means already described, the force of the mainspring eing so much diminished, when the hammer has delivered its blow, ıat the tension of the firing-pin spring is sufficient to overcome the ressure of the hammer on the head of the firing-pin, and to withdraw s point from the face of the block.

Extracted and ejected.—By bent levers on each side of the chamber, orked as is usual in arms of this class.

The frame of this gun is cut out for the sake of lightness; it is slipped ıto a receiver connected with the barrel and secured there by the usual ttachments. The breech-block is made solid with trunnions, instead of aving the usual hinge-pin and hole.

SMOOT, NO. 32.

Five motions, two of which, *i. e.*, loading and closing, may be combined: Cocked; opened; loaded; closed; fired.

Opened.—By cocking the hammer and drawing back the thumb-piece of the cam-lever. A projecting stud on the cam-lever (not shown in the illustration) playing in the cam-recess of the breech-block draws it down into the position of loading.

Closed.—By reversing the movement of the cam-lever, the stud acts on the other side of the cam-recess, and throws up the block until it is met and stopped by the front shoulder of the cam-lever striking against a corresponding shoulder near the front of the block. The motions of loading and closing may be combined by striking the thumb-piece with the palm of the right hand as the cartridge is passed into the chamber.

Locked.—By the position of the breech-block and its friction against the head of the cartridge when the piece is fired. It is still further secured by a projection on the hammer passing under the rear end of the cam-lever, and making it serve as an immovable brace for the block.

Fired.—By a double mainspring center-lock of the usual pattern.

Extraction.—By a sliding extractor, a stud on the inside of which plays in a cam-recess on the outer side of the cam-lever. After passing a certain point in opening the piece the direct pull on the extractor ceases and the ejection is secured—

Ejection.—By the acceleration impressed on the extractor by the action of the ejector-spring on a cam formed on the lower surface of the ejector-lever. The upper end of which lever, striking a shoulder on the extractor, throws it into a groove connected with the cam-recess, driving the shell up the inclined surface of the breech-block until it is clear of the gun.

27 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

Two *of Wood:*

2 Tip Stock,
4 Butt Stock.

Nine *principal metallic parts not otherwise mentioned:*

13 Breech Block,
15 Firing Pin,
8 Frame,
16 Hammer,
18 Guard,
21 Trigger,
29 Extractor,
28 Ejector Lever,
26 Cam Lever.

Nine *Screws:*

14 Breech Block Hinge Scr.,
12 Breech Block Spring Scr.,
17 Hammer Screw,
19 Guard Screw,
20 Guard Screw,
24 Ejector Spring Screw,
27 Cam Lever Screw,
9 Tang Screw,
31 Recoil Stud Screw.

Two *Pins:*

22 Trigger Pin,
8 Main Spring Stop Pin.

Three *Springs:*

11 Breech Block Spring,
25 Main Spring,
23 Ejector Spring.

Two *other minor parts:*

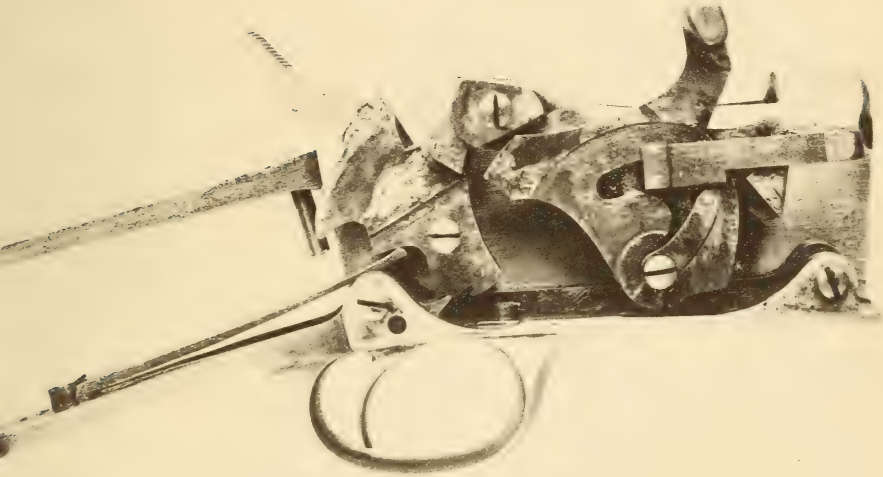
30 Recoil Stud,
30 Recoil Stud Dowel Pin.

27 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

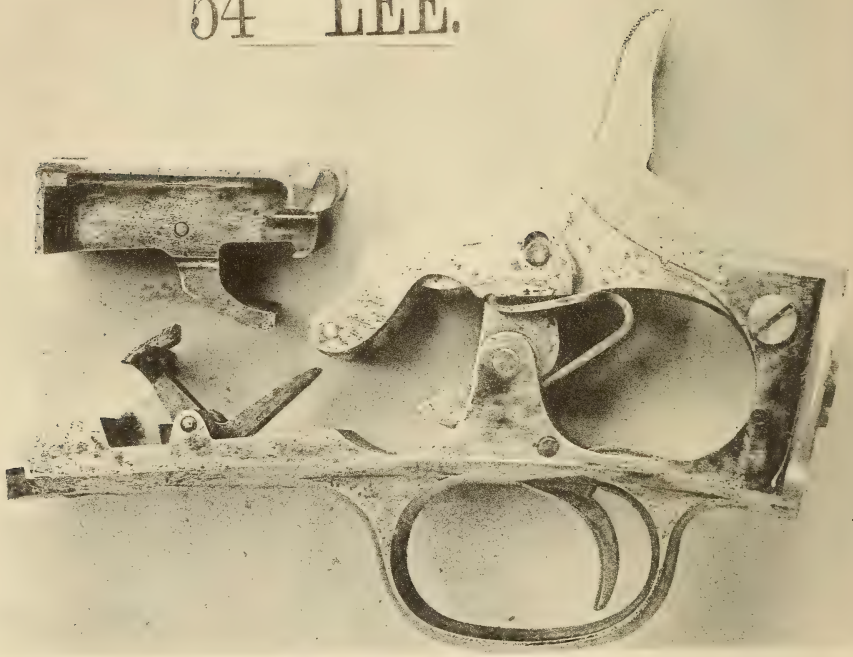
1 Barrel and Front Sight,
3 Ramrod,
5 Butt Plate,
6 Butt Plate Screw,
7 Butt Plate Screw,
32 Upper Band, Swivel and Pin,
35 Upper Band Spring,
33 Middle Band,
36 Middle Band Spring,
34 Lower Band,
37 Lower Band Spring,
38 Tip,
39 Tip Screw,
40 Rear Sight Base,
41 Rear Sight Base Screw,
42 Rear Sight Base Screw,
43 Rear Sight Leaf,
44 Rear Sight Joint Pin,
45 Rear Sight Leaf Slide,
46 Rear Sight Leaf Slide Spring,
47 Rear Sight Leaf Slide Spring Screw,
48 Rear Sight Spring,
49 Rear Sight Spring Screw,
10 Ramrod Stop.

SMOOT, No. 32.

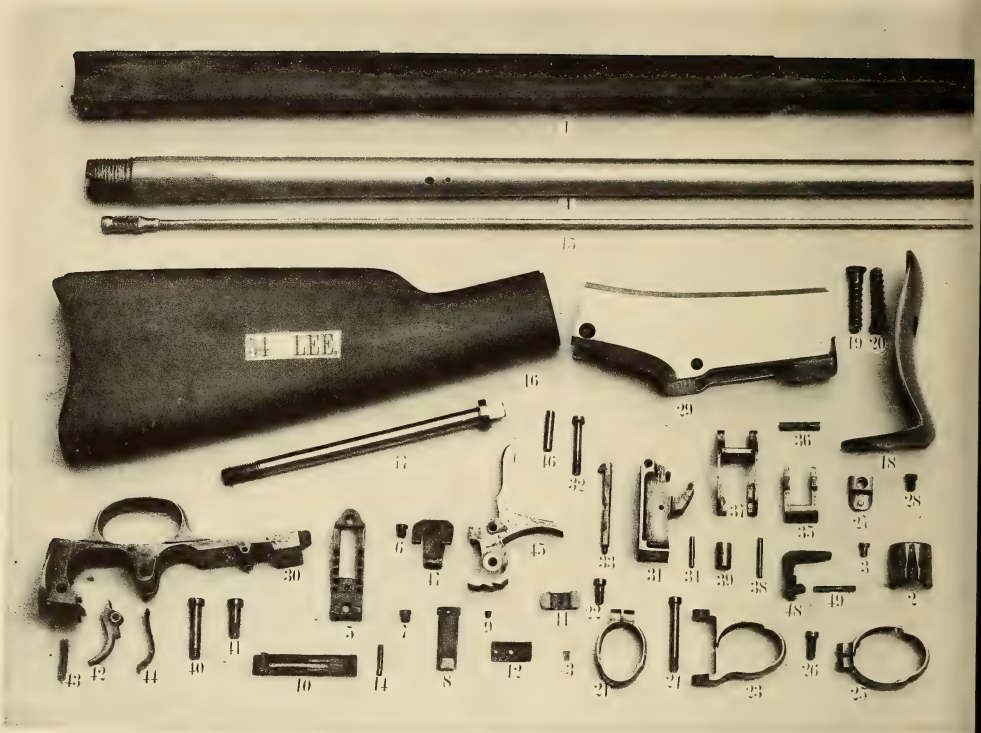
32 W. S. SMOOT.



54 LEE.



For convenience of illustration, the Breech Block is moved a little upward and forward.



28 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

Two *of Wood:*

1 Tip Stock,
16 Butt Stock.

Ten *principal metallic parts not otherwise mentioned:*

17 Butt Stock Bolt,
31 Breech Block,
33 Firing Pin,
35 Link,
37 Block Lever,
30 Guard Plate,
42 Trigger,
45 Hammer,
48 Extractor,
29 Receiver.

Four *Screws:*

32 Breech Block Joint Scr.,
40 Guard Plate Screw, Upper
41 Guard Plate Screw, Lower
28 Recoil Stud Screw.

Seven *Pins:*

34 Firing Pin Stop Pin,
36 Link Pin,
38 Block Lever Friction Roll Pin,
30 Extractor Stop Pin,
43 Trigger Pin,
46 Hammer Pin,
49 Extractor Pin.

Two *Springs:*

44 Trigger Spring,
47 Main Spring.

Three *other minor parts:*

39 Block Lever Friction Roll,
27 Recoil Stud,
27 Recoil Stud Dowel Pin.

24 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

4 Barrel and Front Sight,
18 Butt Plate,
19 Butt Plate Screw,
20 Butt Plate Screw,
15 Ramrod,
2 Tip,
3 Tip Screw,
21 Upper Band,
22 Upper Band Screw,
23 Middle Band,
24 Middle Band Screw,
25 Lower Band,
26 Lower Band Screw,
5 Rear Sight Base,
6 Rear Sight Base Screw,
7 Rear Sight Base Screw,
8 Rear Sight Spring,
9 Rear Sight Spring Screw,
10 Rear Sight Leaf,
11 Rear Sight Leaf Slide,
12 Rear Sight Leaf Slide Cap,
13 Rear Sight Leaf Slide Cap Screw,
14 Rear Sight Joint Pin.

LEE, No. 54.

LEE, NO. 54.

Four motions, viz: Opened; loaded; cocked; fired.

Opened.—By bringing the hammer to the half-cock; in so doing, the hook at the forward end of the link, the rear end of which is pivoted to the front of the hammer, catches into a corresponding notch on the under surface of the breech-block and depresses the block into the loading position. When down it is held by the overhanging lip of the extractor. As the cartridge is passed into the chamber, its rim pushes back the extractor and liberates the block, which is then free to move upward under the influence of the mainspring on the block-lever, as hereafter explained.

Closed.—If this should fail, by bringing the hammer to the full-cock, the block-lever, which is pivoted on the same pin as the link, by the friction-roll lying between its forward branches, passes over the front of the spur on the under surface of the block and throws it up into place. Its first bearing on this spur serves to disengage the block, by throwing out of its notch in the block, the link, the end of which overlies and is lifted up by the rear end of the block-lever.

The tension of the mainspring which is held between the block-lever and the front lower surface of the hammer, serves to throw up and keep in place the block-lever and link, and also through its bearing on the block-lever, to raise the breech-block as soon as the cartridge is inserted.

Locked.—By the position of the breech-block, and its friction against the head of the cartridge when the piece is fired.

Fired.—By the action of a center-lock moved by a mainspring of peculiar form.

Extraction—Ejection.—By a bent lever pivoted below the chamber and struck by the block in its descent.

Retraction.—There is a projection on the under side of the firing-pin near its head, against which the hook of the link catches in opening, and so withdraws the point of the firing-pin from its indentation in the head of the cartridge.

LEE, No. 61.

Four motions, viz: Opened; loaded; cocked; fired.

Opened.—By shoving forward the thumb-piece of the hammer; this throws down the breech-block into the position of loading, where it is detained by the lip of the extractor engaging over its forward end.

Closed.—By inserting the cartridge, its rim catches against the extractor and pushes it back out of the way, so that the force of the mainspring, acting on the block by means of its connection with the hammer through the hammer-pin, presses the block against the cam-shaped surface of the hinge-pin, and when the extractor no longer interferes throws up the block until it is stopped by a projecting lip on its under surface striking the end of the barrel. The breech may also be closed by pressing back the extractor with the point of the finger.

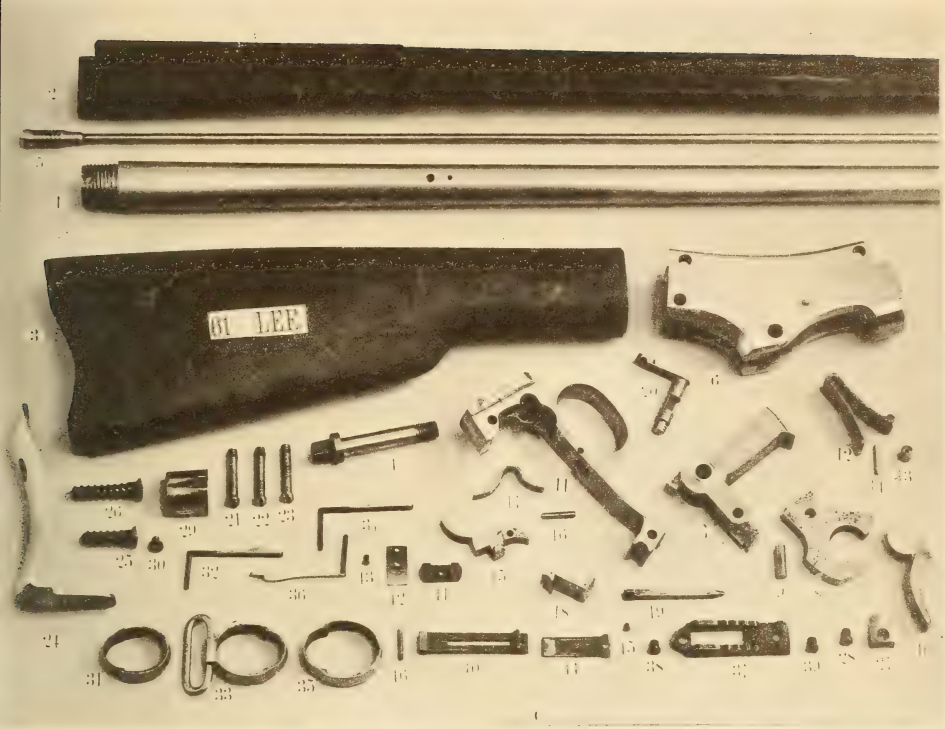
Locked.—By the position of the breech-block and its friction against the head of the cartridge when the piece is fired. It is also kept from moving forward by the lip above referred to, or downward by a projection on the sear portion of the trigger, which, when the trigger is pulled, rises to intercept the motion of the lower arm of the block.

Fired.—By a mainspring, one end of which abuts against the under side of the breech-block and the other end against the lower portion of the hammer; the leaves are pressed together by cocking the hammer.

Extraction.—By the action of the front end of the breech-block on a bent lever with varying fulcra, the first of which is on the front bolster of the guard-strap close to the point of application of the resistance, while by the continued motion of the block, the extractor is removed from this support and the—

Ejection—Is secured by the rapid rocking on the guard-strap of the curved horizontal arm of the extractor, to a point nearer and nearer the point of application of the power.

The butt-stock is counterbored for a stout iron bolt, which passing through it is screwed into the base of the frame.



25 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

EIGHT *principal metallic parts not otherwise mentioned:*

6 Frame,
7 Breech Block,
8 Hammer,
10 Thumb Piece,
11 Guard,
15 Trigger,
18 Extractor,
19 Firing Pin.

FIVE *Screws:*

4 Butt Stock Bolt,
21 Side Screw,
22 Side Screw,
23 Side Screw,
28 Recoil Stud Screw.

FOUR *Pins:*

9 Hammer Pin,
14 Main Spring Friction Roll Pin,
16 Trigger Pin,
20 Hinge Pin.

TWO *Springs:*

12 Main Spring,
17 Trigger Spring.

FOUR *other minor parts:*

6 Hinge Pin Stop,
13 Main Spring Friction Roll,
27 Recoil Stud,
27 Recoil Stud Dowel Pin.

26 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
5 Ramrod,
24 Butt Plate,
25 Butt Plate Screw,
26 Butt Plate Screw,
29 Tip,
30 Tip Screw,
31 Upper Band,
32 Upper Band Spring,
33 Middle Band, Swivel and Pin,
34 Middle Band Spring,
35 Lower Band,
36 Lower Band Spring,
37 Rear Sight Base,
38 Rear Sight Base Screw,
39 Rear Sight Base Screw,
40 Rear Sight Leaf,
41 Rear Sight Leaf Slide,
42 Rear Sight Leaf Cap,
43 Rear Sight Leaf Cap Scr.,
44 Rear Sight Spring,
45 Rear Sight Spring Screw,
46 Rear Sight Joint Pin.

LEE, No. 61.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK, WHICH ROTATES ABOUT A HORIZONTAL AXIS AT 90° TO THE AXIS OF THE BARREL, AND LYING ABOVE THE AXIS OF THE BARREL AND IN REAR—

2.—MOVED FROM BELOW.

PEABODY.

MARTINI.

WESTLEY RICHARDS.

CONROY.

20 o

PEABODY, No. 63.

Five motions, viz: Opened; loaded; closed; cocked; fired. (By special manipulation the third and fourth may be combined.)

Opened.—By depressing the guard-lever, its short arm engages in the recess of the spur beneath the breech-block and draws it down to the position of loading, in which it is maintained by the abutting of the brace-lever upon its friction-roll and pin, under the influence of the brace-lever spring.

Closed.—By reversing the action of the lever, its short arm pushes the breech-block into place, and changes the point of bearing of the brace-lever to one designed to support the breech-block in its new position, in which it is kept by the action of the brace-lever spring. By proper manipulation the hammer may be simultaneously cocked.

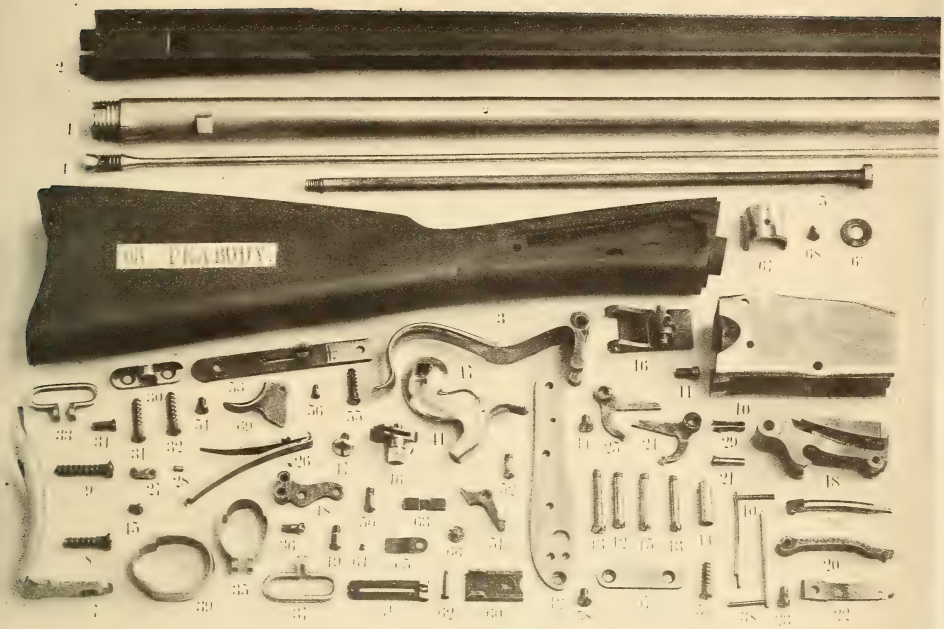
Locked.—By the position of the breech-block and its friction against the head of the cartridge when the piece is fired.

Fired.—By a back-action side-lock of the usual pattern.

Extraction.—By two bent levers pivoted below the mouth of the chamber on each side of it, and struck at the posterior extremity of their horizontal arms by the forward end of the breech-block during its descent.

Ejection.—The continued motion of the breech-block brings its points of application on the extractors nearer and nearer to their fulcra, and thereby accelerates the motion of the upper lever-arms in contact with the cartridge-shell.

The butt-stock is counterbored for a stout iron bolt, the front end of which is screwed into the back of the frame.



46 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

SEVENTEEN *principal metallic parts not otherwise mentioned:*

10 Frame,
16 Joint Strap,
17 Guard Lever,
18 Breech Block,
19 Firing Pin,
20 Brace Lever,
24 Right Hand Extractor,
25 Left Hand Extractor,
41 Hammer,
42 Lock Plate,
46 Tumbler,
48 Bridle,
51 Sear,
69 Trigger,
53 Trigger Plate,
57 Side Strap,
27 Main Spring Swivel.

TWENTY *Screws:*

5 Butt Stock Bolt,
11 Lever Joint Strap Screw,
12 Lever Hinge Screw,
13 Brace Lever Roll Screw,
15 Block Joint Screw,
21 Brace Lever Screw,
23 Brace Lever Spring Scr.,
28 Main Spring Swivel Scr.,
43 Lock Plate Screw,
44 Lock Plate Screw,
45 Main Spring Stop Screw,
47 Tumbler Screw,
49 Bridle Screw,
50 Bridle Screw,
52 Sear Screw,
54 Trigger Plate Screw,
55 Trigger Plate Screw,
56 Trigger Screw,
58 Butt Stock Strap Screw,
59 Butt Stock Strap Screw.

THREE *Springs:*

29 Firing Pin Spring,
22 Brace Lever Spring,
26 Main Spring.

FOUR *other minor parts:*

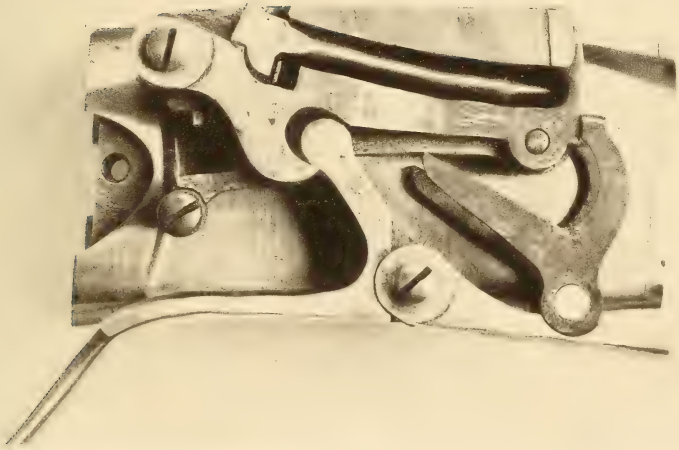
3 Side Screw Washer,
6 Butt Stock Bolt Washer,
14 Brace Lever Friction Roll,
1 Recoil Stud.

26 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

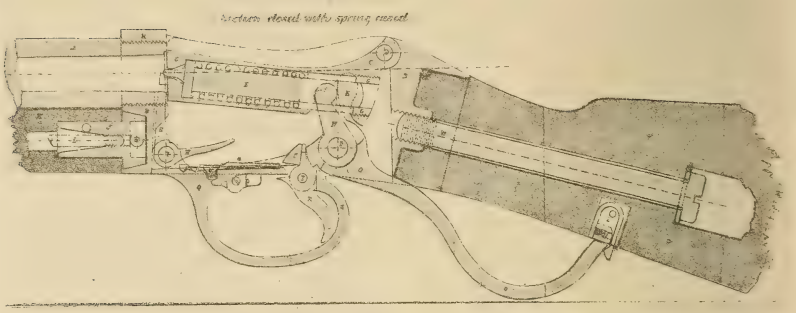
1 Barrel and Front Sight,
4 Ramrod,
7 Butt Plate,
8 Butt Plate Screw,
9 Butt Plate Screw,
35 Upper Band,
36 Upper Band Screw,
37 Upper Band Swivel,
38 Upper Band Spring,
39 Lower Band,
40 Lower Band Spring,
60 Rear Sight Base,
64 Rear Sight Leaf Screw,
61 Rear Sight Leaf,
63 Rear Sight Leaf Slide,
65 Rear Sight Spring,
66 Rear Sight Base Screw,
62 Rear Sight Joint Screw,
67 Tip,
68 Tip Screw,
30 Butt Stock Swivel Plate,
31 Butt Stock Swivel Plate Screw,
32 Butt Stock Swivel Plate Screw,
33 Butt Stock Swivel,
34 Butt Stock Swivel Screw.

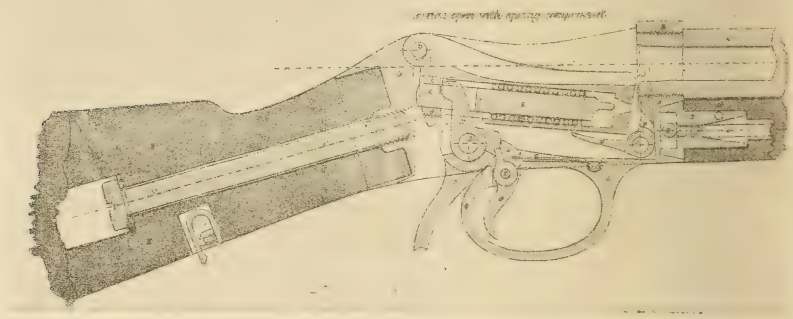
PEABODY, No. 63.

63 PEABODY.



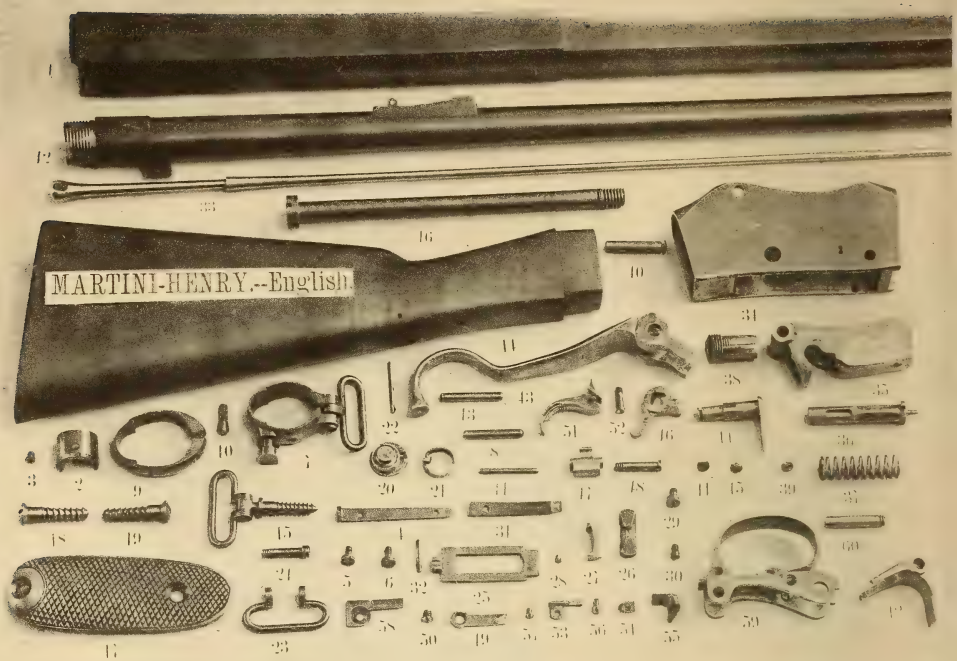
"MARTINI" SYSTEM.





Sections and Names of Components,—"Martini" System,—taken from the Reports of the (British) Committee on Breech Loading Rifles, 1869.

A A. Barrel.
B B. Body.
C C. Block.
D. Block Axis Pin. (Shown slightly too low.)
E. Striker.
F. Main Spring.
G. Stop Nut.
H. Extractor.
I. Extractor Axis Pin.
J. Rod and Fore End Holder.
K. Rod and Fore End Holder Screw.
L. Ramrod.
M. Stock, Fore End.
N. Tumbler.
O. Lever.
P. Lever and Tumbler Axis Pin.
Q. Trigger Plate and Guard.
R. Trigger.
S. Tumbler Rest.
T. Trigger and Rest Axis Pin.
U. Trigger and Rest Spring.
V. Stock Butt.
W. Stock Bolt.
X. Stock Bolt Washer.
Z. Lever Catch Block Spring and Pin.
a. Locking Bolt.
b. Thumb Piece.



36 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

The English names as given in the drawing, when differing from those below, are in brackets.

TWO *of Wood:*

1 Tip Stock,
(M. Stock, Fore End.)
14 Butt Stock.

SIXTEEN *principal metallic parts not otherwise mentioned:*

16 Butt Stock Bolt,
20 Lever Catch,
34 Frame,
(B. Body.)
35 Breech Block,
36 Firing Pin,
(E. Striker.)
38 Firing Pin Stop Nut,
42 Extractor,
43 Lever,
44 Lever Pin,
(P. Lever and Tumbler Axis Pin.)
46 Tumbler,
47 Sear,
(S. Tumbler Rest.)
51 Trigger,
53 Locking Bolt,
54 Locking Bolt Section,
55 Lock'g Bolt Thumb Piece,
59 Guard,
(Q. Trigger Plate & Guard.)

NINE *Screws:*

39 Firing Pin Stop Nut Scr.,
41 Hinge Pin Stop Screw,
45 Lever Pin Stop Screw,
48 Trigger Spring Screw,
50 Sear Spring Screw,
52 Trigger Screw,
(T. Trigger and Rest Axis Pin.)
56 Locking Bolt Section Scr..
57 Locking Bolt Section Scr.,
60 Guard Screw,
(I. Extractor Axis Pin.)

THREE *Pins:*

13 Recoil Stud Pin,
(K. Rod and Fore End Holder Screw.)
22 Lever Catch Pin,
40 Hinge Pin,
(D. Block Axis Pin.)

FOUR *Springs:*

21 Lever Catch Spring,
37 Main Spring,
49 Sear Spring,
(U. Trigger & Rest Sp'g.)
58 Locking Bolt Spring.

TWO *other minor parts:*

12 Recoil Stud,
14 Butt Stock Bolt Washer.

34 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

2 Tip,
3 Tip Screw,
4 Upper Ramrod Stop,
5 Upper Ramrod Stop Scr.,
6 Upper Ramrod Stop Scr.,
7 Upper Band, Band Swivel, Screw and Washer,
8 Upper Band Pin,
9 Lower Band,
10 Lower Band Screw,
11 Lower Band Pin,
12 Barrel, Front Sight and Rear Sight Base,
15 Butt Stock Swivel, Swivel Screw and Pin,
17 Butt Plate,
18 Butt Plate Screw,
19 Butt Plate Screw,
23 Guard Swivel,
24 Guard Swivel Screw,
25 Rear Sight Leaf,
26 Rear Sight Leaf Slide,
27 Rear Sight Leaf Slide Stop,
28 Rear Sight Leaf Slide Stop Screw,
29 Rear Sight Base Screw,
30 Rear Sight Base Screw,
31 Rear Sight Spring,
32 Rear Sight Joint Pin,
33 Ramrod,
1 Lower Ramrod Stop.
(J. Rod and Fore End Holder.)

MARTINI.—ENGLISH.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—By depressing the lever, the motion of its upper arm draws down the breech-block into the position of loading, and by the tumbler, which is on the same axis as the lever and moves with it in this direction only, retracts the firing-pin against the pressure of the surrounding mainspring, the rear end of which abuts against the stop-nut screwed into the back of the block. At the end of the movement the tumbler is sustained against the tension of the mainspring by engaging with the nose of the sear. The piece is then cocked, a condition which is shown by an external indicator connected with the lever-pin.

Closed.—By returning the lever to its place the upper arm pushes up the breech-block until it is stopped by striking the face of the barrel. The upper lever-arm is then engaged in a notch under the block, so that its general direction shall be tangential to the arc of opening.

Locked.—By the position of the block and its friction against the head of the cartridge when the piece is fired. It is also braced by the position of the upper arm of the lever, its point of contact being in advance of its center of motion.

Fired.—By the action of the spiral mainspring, compressed in the act of opening, and released as follows: The tumbler has two notches, one of which is radial and intended for the sear, which may thus sustain the full transmitted pressure of the mainspring without any tendency toward slipping, and one below it for the trigger, sloping slightly upward so as to facilitate its disengagement when the piece is to be fired.

The trigger-pin hole is diagonally elongated and enlarged, so that usually the trigger will hang loosely, but when pressed with the finger to fire the piece, it will rise bodily on the pin along the elongation of the hole, until it presses against the tumbler sufficiently to relieve the sear of some of the stress of the mainspring; at the same time it turns on the pin as a fulcrum, and pressing against a shoulder on the sear, overcomes the resistance of the sear-spring, and pushes the sear out of its notch in the tumbler, so that when released from its own notch, the tumbler and the firing-pin may fall, and so discharge the piece.

This device is intended to lighten the pull-off, and yet to permit the use of a stiff mainspring and of a safe rest for the tumbler when the piece is cocked. Otherwise, unless the notch in the tumbler were made so shallow as to be unsafe, a mainspring of the strength required to explode the cartridge, might bear the tumbler against the trigger so hard, as to unsteady the aim in firing, from the great force needed to discharge the piece.

Extraction.—By two bent levers pivoted below the mouth of the chamber on each side of it, and struck at the posterior extremity of their horizontal arms, by the forward end of the breech-block during its descent.

Ejection.—The continued motion of the breech-block brings its point of application on the extractors nearer and nearer to their fulcra, and

thereby accelerates the motion of the upper lever-arms in contact with the cartridge-shell.

Half-cocked.—A safety-catch, consisting of a slide and external thumb-piece moved backward to block the sear, is intended to replace the ordinary half-cock notch.

The butt-stock is counterbored for a stout iron bolt which is screwed into the back of the frame.

Note.—This system, when wedded to the barrel and ammunition proposed by Mr. Henry, constitutes the Martini-Henry rifle.

WESTLEY RICHARDS, No. 46.

(Withdrawn before being photographed.)

In its general features this arm resembles the Martini, having however the lever separate from and pivoted in front of the guard, and by its movement in opening cocking a true hammer lying concealed beneath the block, and impelled by a flat mainspring placed below the barrel. The blow of the hammer is directly delivered upon the cartridge, a groove for its movement being cut in the under side of the breech-block. The usual extractor in guns of this class is employed.

CONROY, No. 84.

Withdrawn before being photographed or examined with sufficient closeness for an accurate description.

Five motions, viz: Opened; loaded; closed; full-cocked; fired.

Opened.—The arm as first presented was provided with a falling breech-block, moved by a sliding trigger-guard, the withdrawal of which retracted the firing-pin, brought the hammer to the half-cock, and dropped the block, which struck in its descent and operated the usual bent-lever extractor.

Closed.—By pushing the trigger-guard forward again the block was raised, when by bringing the hammer to the full-cock the piece could be fired.

Fired.—The blow of the hammer was not delivered directly upon the firing-pin, but on an intermediate lever pivoted below its point of impact on the firing-pin, and striking it so as to impel it forward in the line of the axis of the bore.

This gun was again presented, after having been altered by substituting for the sliding-guard the more powerful motor found in the usual swinging guard-lever, the angle formed by which with the stock when the piece was opened was of about 30°.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK, WHICH ROTATES ABOUT A HORIZONTAL AXIS AT 90° TO THE AXIS OF THE BARREL, LYING BELOW THE AXIS OF THE BARREL AND IN FRONT.

2.—MOVED FROM ABOVE BY A THUMB-PIECE.

REMINGTON.

REMINGTON-LOCKING, *including*

THOMAS.

REMINGTON-RYDER.

WHITNEY.

DEXTER.

WHITTEMORE.

MUIR-MONT-STORM, No. 60.

UPDEGRAFF.

NOTE.—The application of the firing-pin retractor to arms of this type, is intended to prevent the accidental explosion of the cartridge in the act of closing the piece.

In some of these systems, accident from this cause is still further guarded against, by the temporary locking of the breech by the hammer or locking-brace at the moment that it is closed.

SPANISH-REMINGTON, No. 41.

Five motions, viz: Cocked; opened; loaded; closed; fired.

Essentially the same system as the Remington experimental, model 1870, and the Remington navy-rifle.

Opened.—By bringing the hammer to a full-cock, and then swinging back the breech-block by its projecting thumb-piece.

Closed.—By bringing back the breech-block to its original position, the locking-lever locking fast the sear during the opening of the piece, and thus keeping the hammer from accidentally following up the movement of the block.

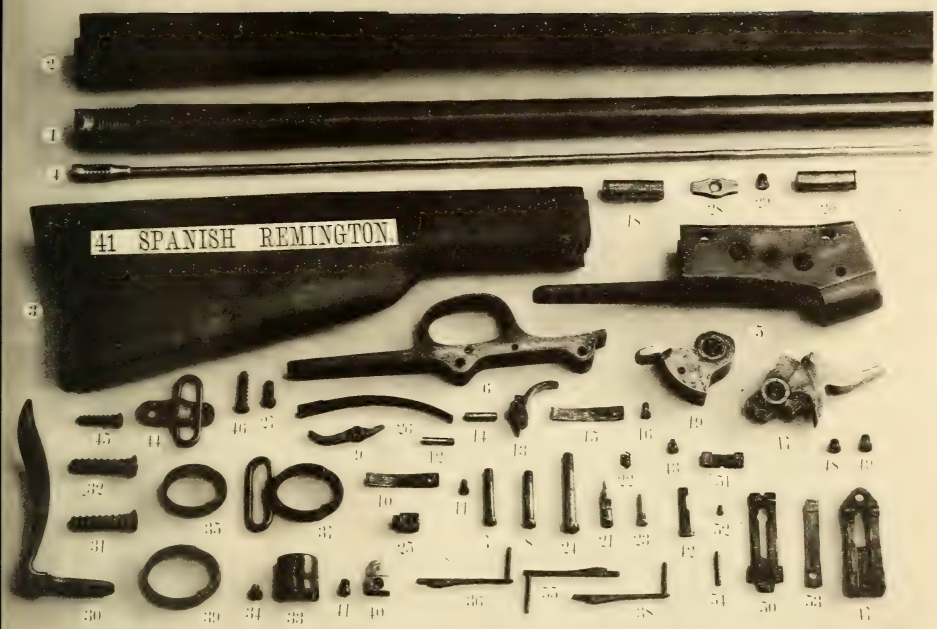
Locked.—By the descent of the hammer under the breech-block when the piece is fired.

Fired.—By a center-lock of the usual pattern.

Extraction.—By a sliding extractor on the left side of the barrel, moved by a shoulder on the hub of the breech-block.

Ejection.—By accelerating the movement of the breech-block with the hand in opening the piece.

Note.—The Remington experimental model, 1870, was one of those issued for comparative trial in the field.



32 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

EIGHT *principal metallic parts not otherwise mentioned:*

5 Frame,
17 Hammer,
19 Breech Block,
21 Firing Pin,
6 Guard,
9 Locking Lever,
13 Trigger,
42 Extractor.

TEN *Screws:*

23 Firing Pin Spring Screw,
7 Guard Screw,
8 Guard Screw,
11 Friction Lever Spr'g Scr.,
16 Sear Spring Screw,
27 Main Spring Screw,
29 Button Screw,
43 Extractor Screw,
24 Tang Screw,
41 Recoil Stud Screw.

FIVE *Pins:*

5 Main Spring Stop Pin,
18 Hammer Pin,
20 Breech Block Pin,
12 Friction Lever Pin,
14 Trigger Pin.

FOUR *Springs:*

22 Firing Pin Spring,
10 Friction Lever Spring,
15 Sear Spring,
26 Main Spring.

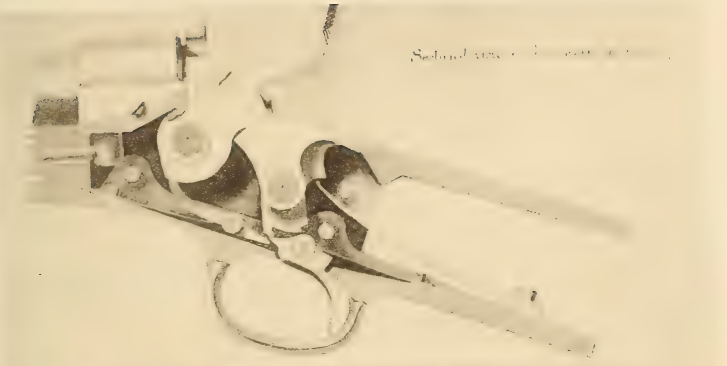
THREE *other minor parts:*

28 Button,
40 Recoil Stud,
40 Recoil Stud Dowel Pin.

30 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
47 Rear Sight Base,
48 Rear Sight Base Screw,
49 Rear Sight Base Screw,
50 Rear Sight Leaf,
51 Rear Sight Leaf Slide,
52 Rear Sight Leaf Screw,
53 Rear Sight Spring,
54 Rear Sight Joint Pin,
30 Butt Plate,
31 Butt Plate Screw,
32 Butt Plate Screw,
33 Tip,
34 Tip Screw,
35 Upper Band,
36 Upper Band Spring,
37 Middle Band, Swivel and Pin,
38 Middle Band Spring,
39 Lower Band,
55 Lower Band Spring,
25 Ramrod Stop,
44 Butt Stock Swivel Plate, Swivel and Pin,
45 Butt Stock Swivel Plate Screw,
46 Butt Stock Swivel Plate Screw.

SPANISH REMINGTON, No. 41.



N°41. THE REMINGTON SYSTEM

SPANISH MODEL

Fig 1 Arm at the moment of discharge

N°19.

THE REMINGTON SYSTEM

REGULAR SYSTEM WITH LEVER EXTRACTOR AND DOUBLE MAIN-SPRING

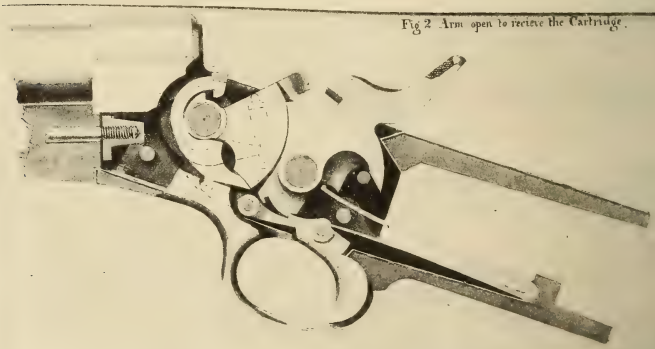
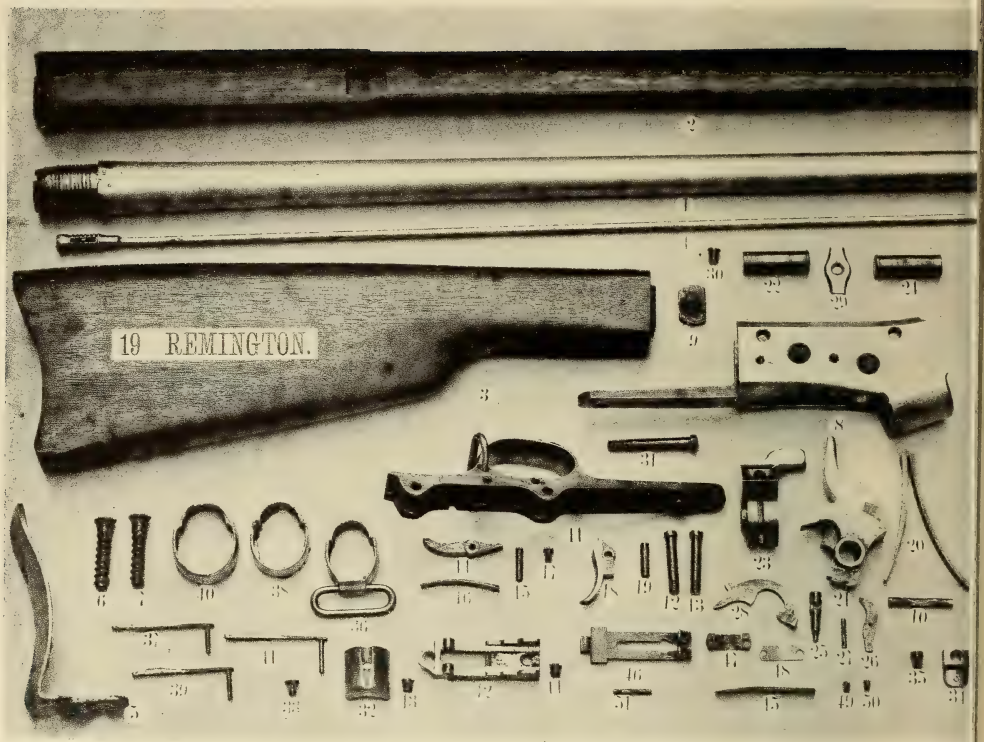


Fig 2 Arm open to recieve the Cartridge.



28 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

Two *of Wood:*

2 Tip Stock,
3 Butt Stock.

Nine *principal metallic parts not otherwise mentioned:*

8 Frame,
21 Hammer,
23 Breech Block,
25 Firing Pin,
26 Firing Pin Retractor,
28 Extractor,
11 Guard,
14 Friction Lever,
18 Trigger.

Six *Screws:*

30 Button Screw,
12 Guard Screw,
13 Guard Screw,
17 Friction Lever Spr'g Scr.,
31 Tang Screw,
35 Recoil Stud Screw.

Six *Pins:*

10 Main Spring Stop Pin,
22 Hammer Pin,
24 Breech Block Pin,
27 Firing Pin Retractor Pin,
15 Friction Lever Pin,
19 Trigger Pin.

Two *Springs:*

16 Friction Lever Spring,
20 Main Spring.

Three *other minor parts:*

29 Button,
34 Recoil Stud,
34 Recoil Stud Dowel Pin.

29 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
5 Butt Plate,
6 Butt Plate Screw,
7 Butt Plate Screw,
32 Tip,
33 Tip Screw,
36 Upper Band, Swivel & Pin,
37 Upper Band Spring,
38 Middle Band,
39 Middle Band Spring,
40 Lower Band,
41 Lower Band Spring,
42 Rear Sight Base,
43 Rear Sight Base Screw,
44 Rear Sight Base Screw,
45 Rear Sight Spring,
46 Rear Sight Leaf,
47 Rear Sight Leaf Slide,
48 Rear Sight Leaf Slide Cap,
49 Rear Sight Leaf Slide Cap Screw,
50 Rear Sight Leaf Slide Cap Screw,
51 Rear Sight Joint Pin,
11 Guard Swivel and Pin,
9 Ramrod Stop.

REMINGTON, No. 19.

REMINGTON, No. 19.

Five motions: Cocked; opened; loaded; closed; fired.

Like No. 41 in every respect, except as to the mainspring, which has two leaves, the lower one bearing on the trigger; and as to the extractor, the claw on the under side of which, in the first movement of opening, is struck by a corresponding shoulder of the breech-block, so near the axis of the latter that power is obtained to start the shell from its seat. By continuing the motion of the block it strikes the short arm of the extractor near its center of motion on the guard, and, by the acceleration thus impressed on its upper end, throws the shell clear of the gun.

REMINGTON, No. 20.

Five motions, viz: Cocked; opened; loaded; closed; fired.

The same as No. 19, with the exception of the extractor, which is a disk rotating on a hub formed in the side of the breech-block concentrically with the pin-hole.

Extraction.—By the striking of a tooth on the edge of the extractor by the bottom of the block in opening.

Ejection.—By accelerating the revolution of the extractor by the action of a flat spring on the cam-shaped surface of a second tooth-like projection on the rim of the extractor.

30 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

NINE *principal metallic parts not otherwise mentioned:*

25 Breech Block,
27 Firing Pin,
28 Firing Pin Retractor,
8 Frame,
23 Hammer,
11 Guard,
14 Friction Lever,
20 Trigger,
53 Extractor.

SEVEN *Screws:*

31 Button Screw,
12 Guard Screw,
13 Guard Screw,
17 Friction Lever Spring Scr.
19 Ejector Spring Screw,
34 Tang Screw,
42 Recoil Stud Screw.

SIX *Pins:*

26 Breech Block Pin,
29 Firing Pin Retractor Pin,
24 Hammer Pin,
10 Main Spring Stop Pin,
15 Friction Lever Pin,
21 Trigger Pin.

THREE *Springs:*

22 Main Spring,
16 Friction Lever Spring,
18 Ejector Spring.

THREE *other minor parts:*

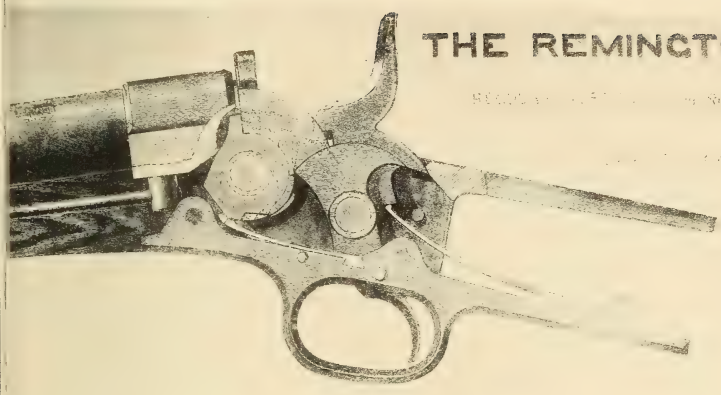
30 Button,
41 Recoil Stud,
41 Recoil Stud Dowel Pin.

29 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

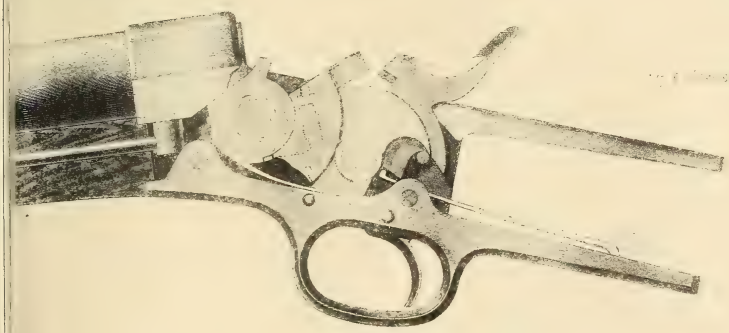
1 Barrel and Front Sight,
4 Ramrod,
5 Butt Plate,
6 Butt Plate Screw,
7 Butt Plate Screw,
32 Tip,
33 Tip Screw,
35 Upper Band, Swivel & Pin,
36 Upper Band Spring,
37 Middle Band,
38 Middle Band Spring,
39 Lower Band,
40 Lower Band Spring,
43 Rear Sight Base,
44 Rear Sight Base Screw,
45 Rear Sight Base Screw,
46 Rear Sight Spring,
47 Rear Sight Leaf,
48 Rear Sight Leaf Slide,
49 Rear Sight Leaf Slide Cap,
50 Rear Sight Leaf Slide Cap Screw,
51 Rear Sight Leaf Slide Cap Screw,
52 Rear Sight Joint Pin,
9 Ramrod Stop,
11 Guard Swivel and Pin.

REMINGTON, No. 20.

THE REMINGTON SYSTEM



N°20



N°43.

THE REMINGTON SYSTEM

REGULAR SYSTEM WITH POWER EXTRACTOR

32 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

Two *of Wood:*

2 Tip Stock,
3 Butt Stock.

Nine *principal metallic parts not otherwise mentioned:*

8 Frame,
25 Hammer,
27 Breech Block,
30 Firing Pin,
31 Firing Pin Retractor,
29 Extractor,
11 Guard,
14 Locking Lever,
18 Trigger.

Eight *Screws:*

12 Guard Screw,
13 Guard Screw,
16 Friction Lever Spr'g Scr.,
21 Sear Spring Screw,
23 Main Spring Screw,
38 Button Screw,
24 Tang Screw,
36 Recoil Stud Screw.

Seven *Pins:*

26 Hammer Pin,
27 Extractor Pin,
28 Breech Block Pin,
32 Firing Pin Retractor Pin,
17 Friction Lever Pin,
19 Trigger Pin,
10 Main Spring Stop Pin.

Three *Springs:*

15 Friction Lever Spring,
20 Sear Spring,
22 Main Spring.

Three *other minor parts:*

35 Recoil Stud,
35 Recoil Stud Dowel Pin,
37 Button.

30 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
5 Butt Plate,
6 Butt Plate Screw,
7 Butt Plate Screw,
33 Tip,
34 Tip Screw,
42 Upper Band,
43 Upper Band Spring,
44 Middle Band, Swivel & Pin,
45 Middle Band Spring,
46 Lower Band,
47 Lower Band Spring,
48 Rear Sight Base,
49 Rear Sight Base Screw,
50 Rear Sight Base Screw,
51 Rear Sight Spring,
52 Rear Sight Leaf,
53 Rear Sight Leaf Slide,
54 Rear Sight Leaf Screw,
55 Rear Sight Joint Screw,
39 Butt Stock Swivel Plate, Swivel and Pin,
40 Butt Stock Swivel Plate Screw,
41 Butt Stock Swivel Plate Screw,
9 Ramrod Stop.

REMINGTON, RYDER EXTRACTOR, No. 43.

REMINGTON, WITH RYDER EXTRACTOR, No. 43.

Five motions, viz: Cocked; opened; loaded; closed; fired.

Like No. 41 in every respect save the extractor, which is known as Ryder's power extractor, and which combines in its operation the functions of the wedge and the lever, the former property being called into play in the first moments of opening, when the ascent of the front portion of the breech-block passes the wedge behind the rim of the cartridge and starts it from its seat. By continuing the motion of the block it bears against the body of the extractor and brings it bodily backward, its motion being accelerated by a quick motion of the hand in opening the piece. The arm also differs from No. 41 in having a firing-pin retractor, like that in No. 21.

SCHOFIELD ALTERATION OF REMINGTON SYSTEM, No. 47.

Six motions, viz: Half-cocked; opened; loaded; closed; full-cocked; fired. Two of these may be combined by first bringing the hammer to the full-cock, at the sacrifice, however, of the distinctive feature of the arm.

Differs only from Remington No. 41, in having the face of the locking-shoulder of the hammer cut away, and in having an undercut notch on the hammer between the other two, which is so placed that when the hammer is resting on it, the breech may be opened and closed without bringing the hammer to the full-cock.

For security in carrying the piece loaded, the breech may be locked by letting down the hammer to the first notch.

32 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

EIGHT *principal metallic parts not otherwise mentioned:*

7 Frame,
8 Breech Block,
10 Hammer,
14 Guard,
29 Firing Pin,
19 Locking Lever,
23 Trigger,
27 Extractor.

TEN *Screws:*

31 Firing Pin Screw,
15 Guard Screw,
16 Guard Screw,
22 Friction Lever Spr'g Scr.,
26 Sear Spring Screw,
18 Main Spring Screw,
13 Button Screw,
28 Extractor Screw,
32 Tang Screw,
35 Recoil Stud Screw.

FIVE *Pins:*

9 Breech Block Pin,
11 Hammer Pin,
40 Main Spring Stop Pin and Frame Swivel Screw,
20 Friction Lever Pin,
24 Trigger Pin.

FOUR *Springs:*

30 Firing Pin Spring,
21 Friction Lever Spring,
25 Sear Spring,
17 Main Spring.

THREE *other minor parts:*

12 Button,
34 Recoil Stud,
34 Recoil Stud Dowel Pin.

14 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Butt Plate,
5 Butt Plate Screw,
6 Butt Plate Screw,
36 Band,
37 Band Spring,
38 Frame Swivel Bar,
39 Frame Swivel Ring,
41 Rear Sight Base,
42 Rear Sight Base Screw,
43 Rear Sight Leaf,
44 Rear Sight Joint Pin,
33 Ramrod Stop.

REMINGTON-SCHOFIELD, No. 47.

Nº 86

REMINGTON SYSTEM WITH WEDGE EXTRACTOR

REMINGTON NAVY-RIFLE, No. 85.

Originally of the same system as is now in use in the United States Navy, resembling altogether that of Remington No. 41 and the experimental model of 1870, on which are based the reports from the field.

This arm was altered to caliber .45, and provided with the Ryder power extractor, the work being done at the National Armory, Springfield, Massachusetts, by order of the Board.

REMINGTON, No. 86.

The same as the preceding in every respect, except as to the mainspring, which is made with two leaves, as in Remington No. 19. This arm was made at the Remingtons' armory, Ilion, New York.

REMINGTON LOCKING-RIFLE, No. 82.

Six motions, viz: Cocked; opened; loaded; closed; full-cocked; fired.

Opened.—By bringing the hammer to the full-cock, and then swinging down the breech-block by its projecting thumb-piece. In the first part of its descent, its lower portion which is cam-shaped, rides over the front end of the lever-hook and lifts up the rear end, bearing the hook into the corresponding notch in the tumbler-end of the hammer. As its movement is continued, it strikes a long arm, extending forward from the right side of the sear, and throws the sear out of the full-cock notch. This permits the mainspring to throw forward the hammer against the back of the block, and to engage it fully with the lever-hook.

Closed.—As the block is closed in the manner usual to arms of this type, the hammer bears against it until it is shut, when the force of the mainspring throws the hammer forward and under the block to the extent permitted by the elongated shape of the lever-hook pin-hole. The hammer is now entirely supported by the lever-hook.

Locked.—The breech is thus locked against accidental discharge in loading, and is still further secured by the complete descent of the hammer under the block when the piece is fired.

Fired.—By again bringing the hammer to the full-cock, and pressing on, the trigger in the usual way, a projection on the trigger presses down the hook end of the lever-hook out of its notch in the hammer; so that when the sear, which is on the same pin as the trigger and moves with it in this direction, is off the full-cock notch, the hammer may fall. As soon as released by the trigger from its notch in the hammer, the lever-hook is drawn forward into place by the friction-spring.

Extraction.—By a disk swinging on a hub formed around the pin-hole in the side of the breech-block and provided with one projection, against which a corresponding shoulder of the block strikes in opening, and another projection which engages with the rim of the cartridge.

Ejection.—By the acceleration impressed on the extractor by the end of a flat ejector-spring riding over a cam-shaped projection on its rim.

NOTE.—In opening the breech, the firing-pin in case of accidentally sticking forward, is loosened in its hole and is always drawn back, by engaging with a notched retractor, through the head of which, also notched, motion is imparted by a corresponding tooth on the rim of the extractor.

The friction-fly being pressed by its spring against the lower surface of the breech-block, enables the latter to remain closed against slight disturbances when the support of the hammer is withdrawn.

36 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

ELEVEN *principal metallic parts not otherwise mentioned:*

11 Breech Block,
14 Firing Pin,
15 Firing Pin Retractor,
13 Frame,
9 Hammer,
17 Guard,
20 Lever Hook,
24 Friction Fly,
31 Trigger,
35 Sear,
26 Extractor.

EIGHT *Screws:*

37 Button Screw,
18 Guard Screw,
19 Guard Screw,
22 Friction Fly Spring Scr.,
29 Main Spring Screw,
34 Sear Spring Screw,
30 Tang Screw,
41 Recoil Stud Screw.

SIX *Pins:*

12 Breech Block Pin,
13 Main Spring Stop Pin,
10 Hammer Pin,
23 Lever Hook Pin,
32 Trigger Pin,
28 Main Spring Friction Roll Pin.

FIVE *Springs:*

21 Friction Spring,
25 Friction Fly Spring,
28 Main Spring,
33 Sear Spring,
27 Ejector Spring.

FOUR *other minor parts:*

40 Recoil Stud,
36 Button,
40 Recoil Stud Dowel Pin,
28 Main Spring Friction Roll.

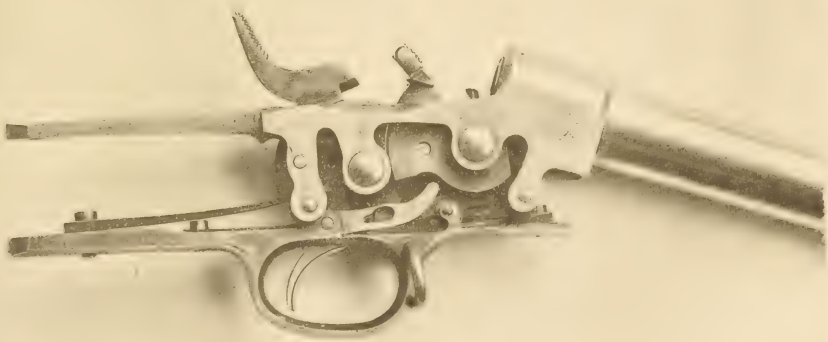
25 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
6 Butt Plate,
7 Butt Plate Screw,
8 Butt Plate Screw,
38 Tip,
39 Tip Screw,
42 Upper Band,
43 Upper Band Spring,
44 Upper Band Swivel,
45 Upper Band Swivel Scr.,
46 Lower Band,
47 Lower Band Spring,
48 Rear Sight Base,
49 Rear Sight Leaf,
50 Rear Sight Leaf Slide,
51 Rear Sight Leaf Screw,
52 Rear Sight Joint Screw,
53 Rear Sight Spring,
54 Rear Sight Base Screw,
17 Guard Swivel and Pin,
5 Ramrod Stop, Upper
16 Ramrod Stop, Lower

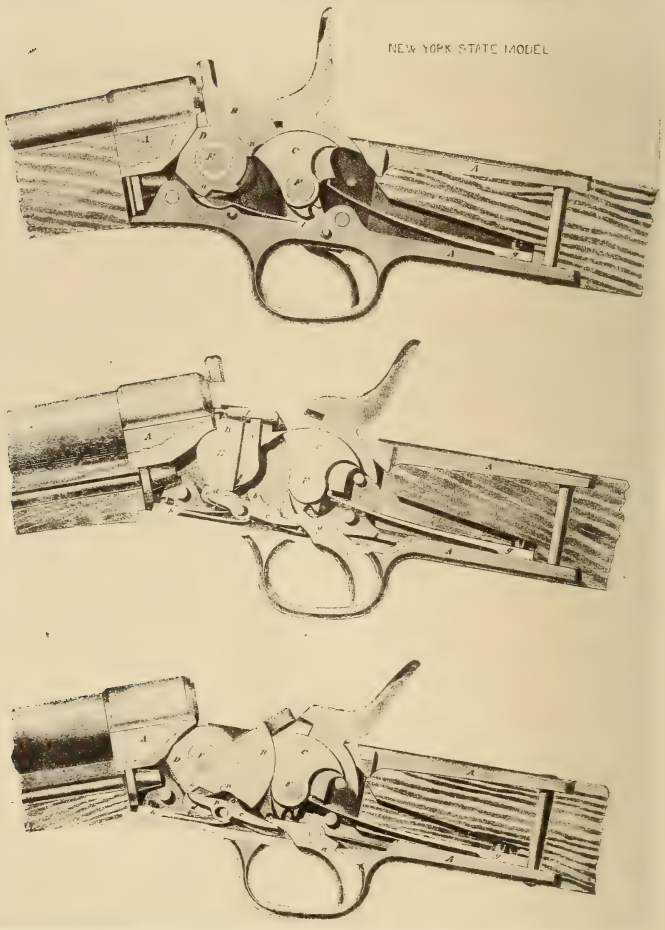
REMINGTON LOCKING RIFLE, No. 82.

82 Remington Locking Rifle, Model 1871.

82 Remington Locking Rifle, Model 1871.



No. 21. THE REMINGTON SYSTEM



35 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

ELEVEN *principal metallic parts not otherwise mentioned:*

11 Breech Block,
14 Firing Pin,
15 Firing Pin Retractor,
13 Frame,
9 Hammer,
17 Guard,
20 Lever Hook,
24 Friction Fly,
31 Trigger,
35 Sear,
26 Extractor.

EIGHT *Screws:*

37 Button Screw,
18 Guard Screw,
19 Guard Screw,
22 Friction Fly Spring Scr.,
29 Main Spring Screw,
34 Sear Spring Screw,
30 Tang Screw,
41 Recoil Stud Screw.

SIX *Pins:*

12 Breech Block Pin,
16 Firing Pin Retractor Pin,
13 Main Spring Stop Pin,
10 Hammer Pin,
23 Lever Hook Pin,
32 Trigger Pin.

FIVE *Springs:*

21 Friction Spring,
25 Friction Fly Spring,
28 Main Spring,
33 Sear Spring,
27 Ejector Spring.

THREE *other minor parts:*

40 Recoil Stud,
36 Button,
40 Recoil Stud Dowel Pin.

27 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
6 Butt Plate,
7 Butt Plate Screw,
8 Butt Plate Screw,
38 Tip,
39 Tip Screw,
42 Upper Band, Swivel & Pin,
43 Upper Band Spring,
44 Middle Band,
45 Middle Band Spring,
46 Lower Band,
47 Lower Band Spring,
48 Rear Sight Base,
49 Rear Sight Leaf,
50 Rear Sight Leaf Slide,
51 Rear Sight Leaf Screw,
52 Rear Sight Joint Pin,
53 Rear Sight Spring,
54 Rear Sight Base Screw,
55 Rear Sight Base Screw,
17 Guard Swivel and Pin,
5 Ramrod Stop.

REMINGTON LOCKING RIFLE, No. 21.

REMINGTON LOCKING-RIFLE, No. 21. (N. Y. State model.)

Six motions, viz: Cocked; opened; loaded; closed; full-cocked; fired.

Differs from No. 82 only in the form of the firing-pin retractor, which is a straight lever pivoted in a groove in the lower part of the breech-block, its upper end engaging with a notch in the firing-pin, and the lower end projecting from the back of the block, and so formed that in riding over the friction-fly in opening, it will be closed into the block, thus drawing back its upper end and with it the firing-pin.

THOMAS, No. 44.

Six motions, viz: Cocked; opened; loaded; closed; full-cocked; fired.

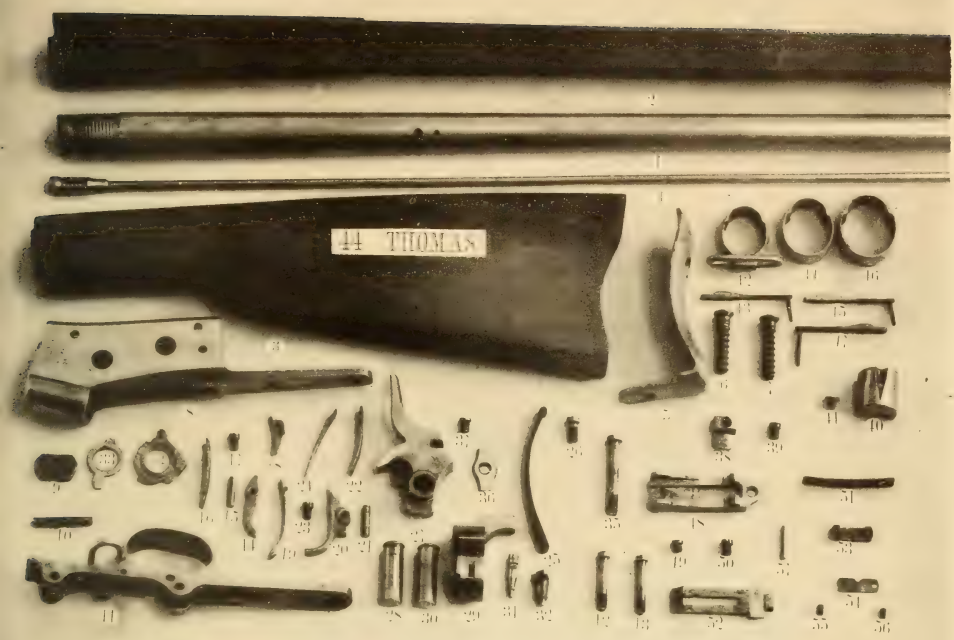
Opened.—By bringing the hammer to the full-cock and drawing back the breech-block by its thumb-piece; as it descends it retracts the firing-pin by the action of the hammer-stop lever on the projecting head of the retractor, the notched body of which engages with a notch on the firing-pin, and it also presses down one end of the friction-lever, the other end of which locks the sear and keeps the hammer from falling until the breech is closed.

Closed.—By reversing the movement of the block; as it rises, a projection on its lower surface trips the friction-lever and throws the sear out of its notch, allowing the hammer to fall forward against the back of the block, and to rest on it until the breech is fully closed. It then passes under the block until stopped by striking against the projecting head of the retractor called the hammer-stop, which has been pushed out into place by its lever during the upward movement of the block. The block is thereby secured against the effect of any accidental discharge in closing, but it is afterward more completely—

Locked.—By the descent of the hammer beneath the breech-block when the piece is fired.

Fired.—By a center-lock of the usual pattern.

Extraction and *ejection* are essentially the same as shown in Remington, No. 21.



37 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

TWELVE *principal metallic parts not otherwise mentioned:*

8 Frame,
29 Breech Block,
31 Firing Pin,
32 Firing Pin Retractor,
32 Hammer Stop,
33 Hammer Stop Lever,
27 Hammer,
11 Guard,
14 Friction Lever,
18 Friction Lever Fly,
34 Extractor,
20 Trigger.

EIGHT *Screws:*

37 Button Screw,
12 Guard Screw,
13 Guard Screw,
17 Friction Lever Spr'g Scr.,
23 Trigger Spring Screw,
26 Main Spring Screw,
35 Tang Screw,
39 Recoil Stud Screw.

SIX *Pins:*

30 Breech Block Pin,
28 Hammer Pin,
10 Main Spring Stop Pin,
15 Friction Lever Pin,
21 Trigger Pin,
25 Main Spring Friction Roll Pin.

FIVE *Springs:*

16 Friction Lever Spring,
19 Extractor Spring,
22 Trigger Spring,
24 Friction Fly Spring,
25 Main Spring.

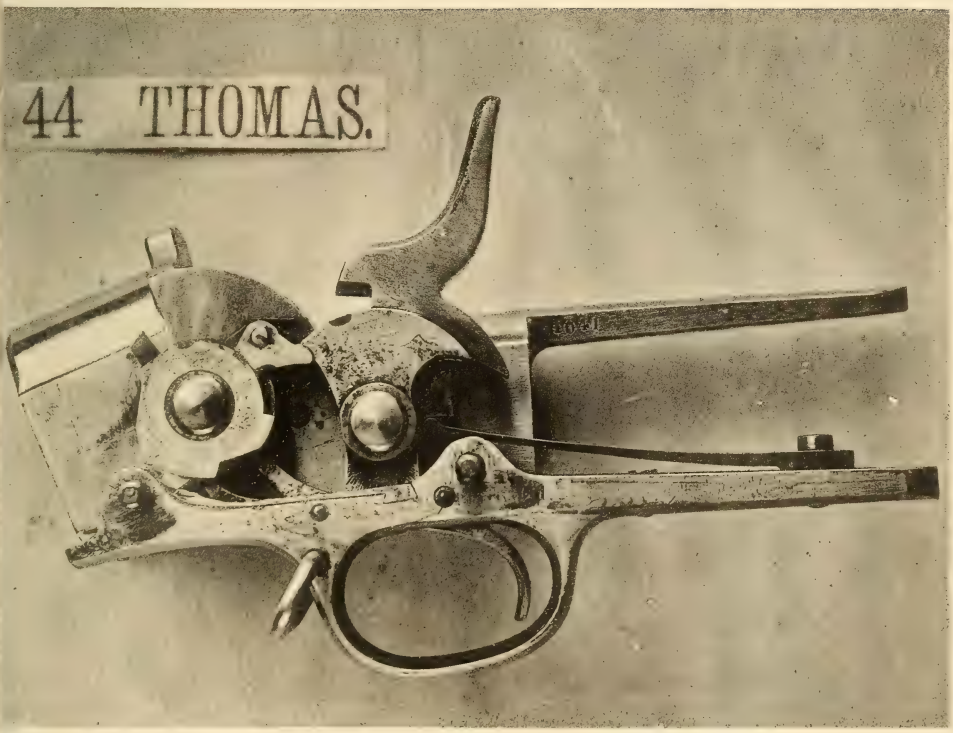
FOUR *other minor parts:*

36 Button,
38 Recoil Stud,
38 Recoil Stud Dowel Pin,
25 Main Spring Friction Roll.

29 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
5 Butt Plate,
6 Butt Plate Screw,
7 Butt Plate Screw,
40 Tip,
41 Tip Screw,
42 Upper Band, Swivel & Pin,
43 Upper Band Spring,
44 Middle Band,
45 Middle Band Spring,
46 Lower Band,
47 Lower Band Spring,
48 Rear Sight Base,
49 Rear Sight Base Screw,
50 Rear Sight Base Screw,
51 Rear Sight Spring,
52 Rear Sight Leaf,
53 Rear Sight Leaf Slide,
54 Rear Sight Leaf Slide Cap,
55 Rear Sight Leaf Slide Cap Screw,
56 Rear Sight Leaf Slide Cap Screw,
57 Rear Sight Joint Pin,
9 Ramrod Stop,
11 Guard Swivel and Pin.

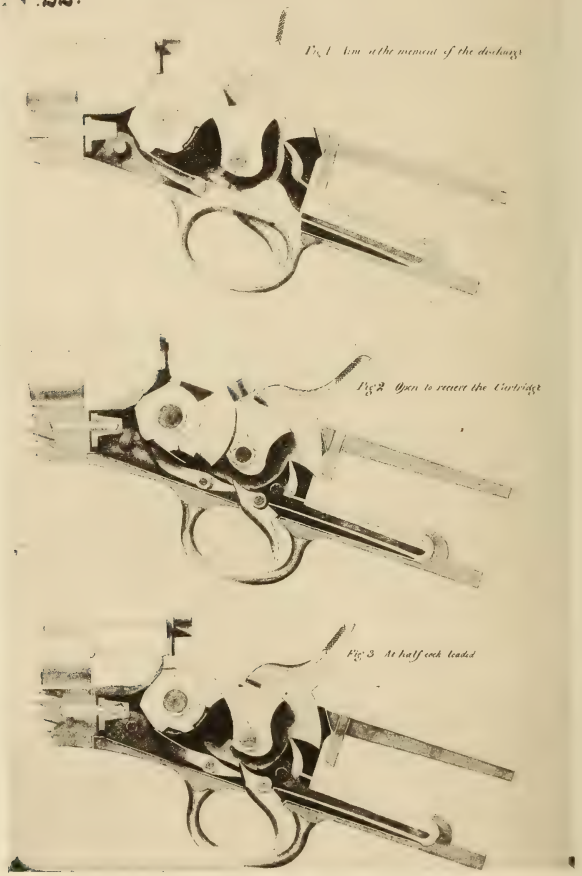
THOMAS, No. 44.


44 THOMAS.

THE REMINGTON-RYDER SYSTEM

No. 22.

LOADING AT HALF COCK ONLY



33 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

Two *of Wood:*

2 Tip Stock,
3 Butt Stock.

Twelve *principal metallic parts not otherwise mentioned:*

29 Breech Block,
31 Firing Pin,
32 Firing Pin Retractor,
8 Frame,
23 Hammer,
11 Guard,
14 Friction Lever,
18 Trigger,
25 Locking Brace,
27 Locking Brace Sear,
56 Extractor,
21 Main Spring Swivel.

Six *Screws:*

37 Button Screw,
12 Guard Screw,
13 Guard Screw,
17 Ejector Spring Screw,
10 Tang Screw,
39 Recoil Stud Screw.

Eight *Pins:*

30 Hammer Pin,
33 Firing Pin Retractor Pin,
24 Breech Block Pin,
15 Friction Lever Pin,
19 Trigger Pin,
22 Main Spring Swivel Pin,
26 Locking Brace Pin,
28 Locking Brace Sear Pin.

Two *Springs:*

16 Ejector Spring,
20 Main Spring and Trigger Spring (combined).

Three *other minor parts:*

38 Recoil Stud,
38 Recoil Stud Dowel Pin,
36 Button.

29 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
5 Butt Plate,
6 Butt Plate Screw,
7 Butt Plate Screw,
34 Tip,
35 Tip Screw,
40 Upper Band, Swivel & Pin,
41 Upper Band Spring,
42 Middle Band,
43 Middle Band Spring,
44 Lower Band,
45 Lower Band Spring,
46 Rear Sight Base,
47 Rear Sight Base Screw,
48 Rear Sight Base Screw,
49 Rear Sight Spring,
50 Rear Sight Leaf,
51 Rear Sight Leaf Slide,
52 Rear Sight Leaf Slide Cap,
53 Rear Sight Leaf Slide Cap Screw,
54 Rear Sight Leaf Slide Cap Screw,
55 Rear Sight Joint Pin,
11 Guard Swivel and Pin,
9 Ramrod Stop.

REMINGTON, No. 22.

REMINGTON-RYDER, No. 22.

(Loading at half-cock only.)

Six motions, viz: Half-cocked, opened, loaded, closed, full-cocked, and fired.

Opened.—By bringing the hammer to the half-cock, the locking-brace sear, which is pivoted to its lower front portion, is pressed upward by riding over the nose of the trigger. It engages with the under side of the locking-brace, and causes it to follow the motion of the hammer until the latter is arrested on the half-cock notch.

Closed.—As the breech-block is drawn backward and downward by the usual means it strikes the locking-brace sear from above and throws it out of its notch in the brace. The hammer then, impelled by the main-spring and riding on its half-cock notch as a fulcrum, moves forward, carrying with it the locking-brace, by means of the transverse-pin connecting them, and causing it to bear against the back of the breech-block. When the breech is closed by the ordinary means, the hammer passes under the block, until arrested by striking a shoulder formed on its under surface.

Locked.—The piece is thereby locked independently of the hammer, which may then be cocked in the usual way.

Fired.—By a center-lock of the usual pattern, having a combined main and sear spring.

Extraction and ejection.—By the means described in No. 20.

NOTE.—After firing the piece, the hammer cannot be directly brought to the full-cock, for the revolution of the hammer-pin about the locking-brace pin in opening, brings the bearing of the hammer so low, that further motion is prevented, by the back of the comb of the hammer coming in contact with the top of the receiver.

REMINGTON-RYDER, No. 67.

(Loading at half-cock only.)

Six motions, viz: Cocked; opened; loaded; closed; full-cocked; fired.

Opened.—By bringing the hammer to the half-cock, the locking-brace-sear, which is pivoted on the lower portion of the hammer and pressed upward in passing over the nose of the trigger, engages against the back of the locking-brace below its center of motion. This causes its upper portion to follow the backward movement of the hammer, until the sear-fly, which is independent of the trigger and operated by the lower leaf of the mainspring, catches in its notch in the hammer, and keeps the hammer and brace together in place against the pressure of the mainspring.

Closed.—By then swinging back the breech-block into the space left by the withdrawal of the locking-brace, it trips the locking-brace-sear out of its notch, and when the breech is closed by the usual means, allows the locking-brace and hammer to swing forward together on the locking-brace pin, until the former strikes a notch prepared for it under the breech-block. The hammer meanwhile moving bodily on the same center as the brace, and by the longitudinal motion thus obtained preserving its contact with the sear-fly, is kept by it from following up the movement of the block. The change so caused in the position of the sear-fly changes the direction of the pressure of the lower leaf of the mainspring on its rearmost cam-shaped surface, so that when the hammer is brought to the full-cock, this pressure tends to throw the fly out of the notch in the hammer, instead of into it as before.

Locked.—By the position of the locking-brace independently of the hammer, which, when the breech has been closed, may be cocked in the usual way.

Fired.—By a center-lock of the usual pattern, the mainspring of which is double and has its lower leaf split near the end, so as to act upon both the trigger and the sear-fly.

Extraction and ejection.—By a mechanism essentially like that shown in No. 43, the ejection being helped by a flat spring playing on a cam-shaped shoulder on the rim of the extractor.

NOTE.—A shoulder is formed on the upper surface of the sear-fly, against which the end of the mainspring bears when the hammer and block are removed from the frame. A supplementary notch is formed in the lower surface of the locking-brace sear, which engages with the nose of the trigger, should the hammer be lowered to the half-cock after loading.

After firing, the hammer cannot be brought directly to the full-cock for the reason given in No. 22.

28 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

Two *of Wood:*

2 Tip Stock,
3 Butt Stock.

Eleven *principal metallic parts not otherwise mentioned:*

10 Breech Block,
12 Firing Pin,
13 Firing Pin Retractor,
5 Frame,
6 Guard,
15 Trigger,
17 Locking Brace Sear,
19 Sear Fly,
20 Hammer,
22 Locking Brace,
26 Extractor.

Four *Screws:*

7 Guard Screw,
8 Guard Screw,
29 Recoil Stud Screw,
25 Tang Screw.

Six *Pins:*

11 Breech Block Pin,
14 Firing Pin Retractor Pin,
16 Trigger Pin,
18 Locking Brace Sear Pin,
21 Hammer Pin,
23 Locking Brace Pin.

Two *Springs:*

9 Main Spring,
27 Ejector Spring.

Three *other minor parts:*

24 Button,
28 Recoil Stud,
28 Recoil Stud Dowel Pin.

26 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
30 Butt Plate,
31 Butt Plate Screw,
32 Butt Plate Screw,
33 Tip,
34 Tip Screw,
35 Upper Band, Swivel & Pin,
36 Upper Band Spring,
37 Middle Band,
38 Middle Band Spring,
39 Lower Band,
40 Lower Band Spring,
41 Rear Sight Base,
42 Rear Sight Base Screw,
43 Rear Sight Base Screw,
44 Rear Sight Leaf,
45 Rear Sight Leaf Slide,
46 Rear Sight Leaf Screw,
47 Rear Sight Joint Pin,
48 Rear Sight Spring,
6 Guard Swivel and Pin.

REMINGTON-RYDER, No. 67.

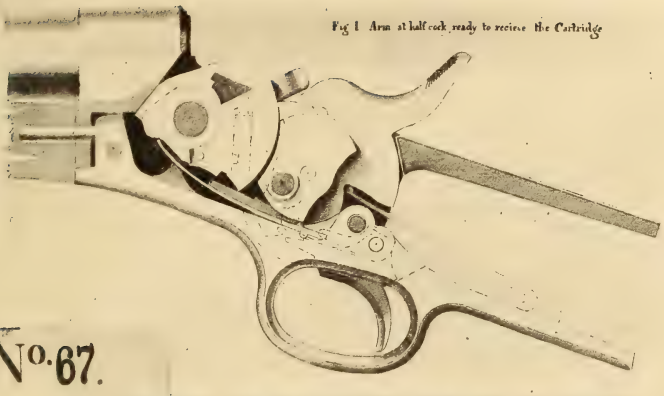


Fig 1 Arm at half cock ready to receive the Cartridge

No. 67.

THE REMINGTON-RYDER SYSTEM

LOADING AT HALF COCK ONLY

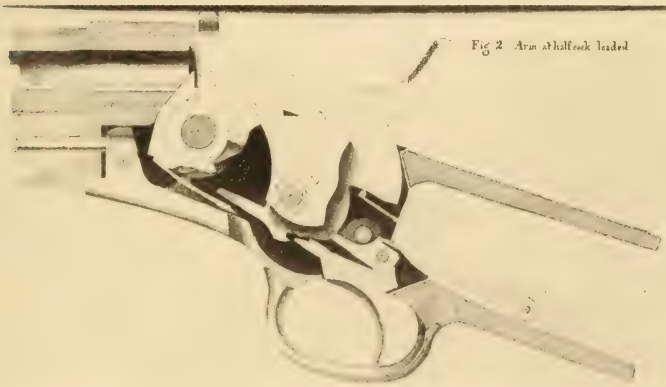


Fig 2 Arm at half cock loaded

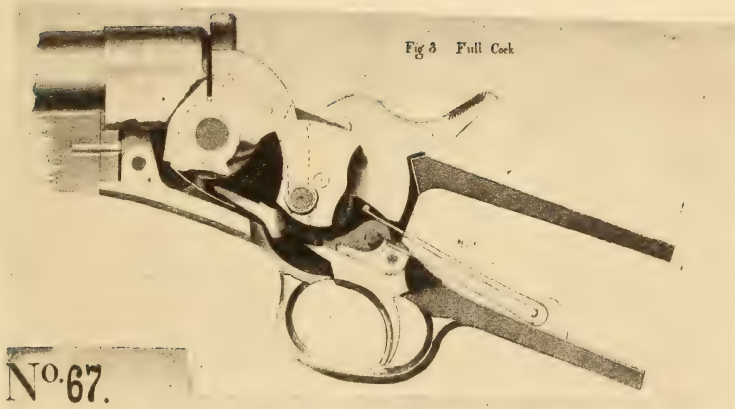


Fig 3 Full Cock

No. 67.

THE REMINGTON-RYDER SYSTEM

LOADING AT HALF COCK ONLY

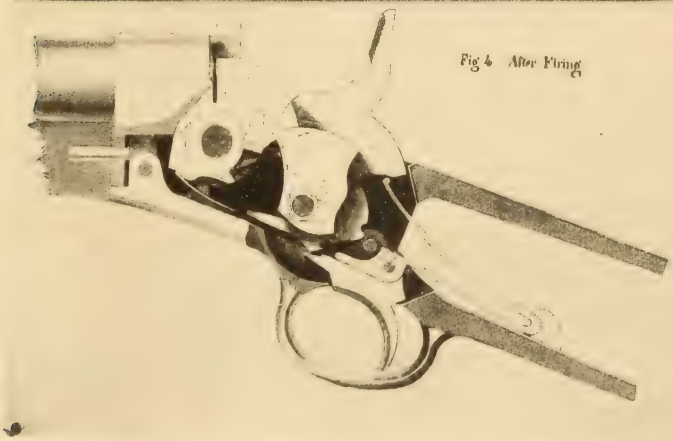


Fig 4 After Firing

38 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

NINE *principal metallic parts not otherwise mentioned:*

10 Frame,
26 Hammer,
28 Locking Brace,
31 Breech Block,
33 Cam Lever,
34 Firing Pin,
13 Guard,
16 Trigger,
54 Extractor.

TWELVE *Screws:*

29 Hammer Pin Screw,
30 Breech Block Pin Screw,
35 Firing Pin Screw,
12 Main Spring Stop Screw,
24 Main Spring Screw,
14 Guard Screw,
15 Guard Screw,
19 Trigger Spring Screw,
22 Friction Spring Screw,
55 Extractor Screw,
38 Recoil Stud Screw,
20 Tang Screw.

FIVE *Pins:*

27 Hammer Pin,
28 Locking Brace Friction Roll Pin,
32 Breech Block Pin,
23 Main Spring Friction Roll Pin,
17 Trigger Pin.

FIVE *Springs:*

36 Firing Pin Spring,
23 Main Spring,
25 Locking Brace Spring,
18 Trigger Spring,
21 Friction Spring.

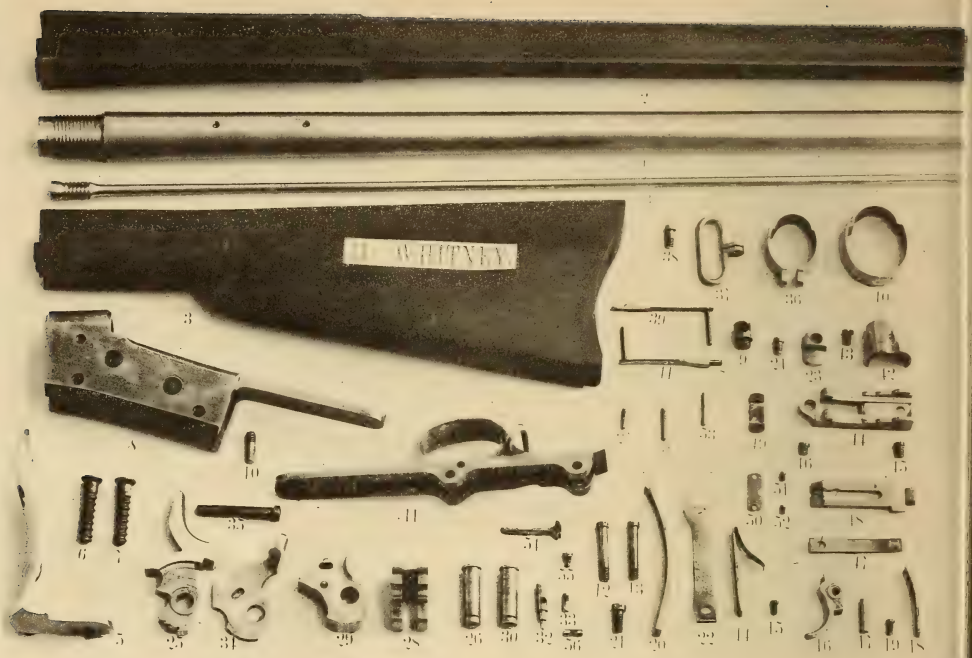
FIVE *other minor parts:*

28 Locking Brace Friction Roll,
23 Main Spring Friction Roll,
37 Recoil Stud,
37 Recoil Stud Dowel Pin,
31 Cam Lever Stop Pin.

26 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
5 Butt Plate,
6 Butt Plate Screw,
7 Butt Plate Screw,
8 Tip,
9 Tip Screw,
39 Upper Band,
40 Upper Band Spring,
41 Upper Band Swivel,
42 Upper Band Swivel Scr.,
43 Lower Band,
44 Lower Band Screw,
45 Lower Band Spring,
46 Rear Sight Base,
47 Rear Sight Base Screw,
48 Rear Sight Base Screw,
49 Rear Sight Spring,
50 Rear Sight Leaf,
51 Rear Sight Leaf Slide,
52 Rear Sight Leaf Screw,
53 Rear Sight Joint Pin,
13 Guard Swivel and Pin,
11 Ramrod Stop.

WHITNEY, No. 10.



35 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

Two *of Wood:*

2 Tip Stock,
3 Butt Stock.

Nine *principal metallic parts not otherwise mentioned:*

8 Frame,
25 Hammer,
28 Locking Brace,
29 Breech Block,
32 Firing Pin,
34 Cam Lever,
54 Extractor,
11 Guard,
16 Trigger.

Twelve *Screws:*

27 Hammer Pin Screw,
31 Breech Block Pin Screw,
33 Firing Pin Retractor Scr.,
55 Extractor Stop Screw,
10 Main Spring Stop Screw,
21 Main Spring Screw,
12 Guard Screw,
13 Guard Screw,
15 Friction Spring Screw,
19 Trigger Spring Screw,
24 Recoil Stud Screw,
35 Tang Screw.

Five *Pins:*

26 Hammer Pin,
30 Breech Block Pin,
56 Cam Lever Stop Pin,
20 Main Spring Friction Roll Pin,
17 Trigger Pin.

Four *Springs:*

22 Locking Brace Spring,
20 Main Spring,
14 Friction Spring,
18 Trigger Spring.

Three *other minor parts:*

20 Main Spring Friction Roll,
23 Recoil Stud,
23 Recoil Stud Dowel Pin.

26 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
5 Butt Plate,
6 Butt Plate Screw,
7 Butt Plate Screw,
36 Upper Band,
37 Upper Band Swivel,
38 Upper Band Screw,
39 Upper Band Spring,
40 Lower Band,
41 Lower Band Spring,
42 Tip,
43 Tip Screw,
44 Rear Sight Base,
45 Rear Sight Base Screw,
46 Rear Sight Base Screw,
47 Rear Sight Spring,
48 Rear Sight Leaf,
49 Rear Sight Leaf Slide,
50 Rear Sight Leaf Slide Cap,
51 Rear Sight Leaf Slide Cap Screw,
52 Rear Sight Leaf Slide Cap Screw,
53 Rear Sight Joint Pin,
9 Ramrod Stop,
11 Guard Swivel.

WHITNEY, No. 11.

WHITNEY, Nos. 10, 11, and 77.

Five motions, viz: Cocked, opened, loaded, closed, and fired.

Opened.—After bringing the hammer to the half- or full-cock, by the first motion of drawing back the cam-lever by its thumb-piece, the truncated corner in rear bears upon the corresponding shoulder of the locking-brace, and pushes it back against the pressure of the locking-brace spring until it is clear of the breech-block. By continuing the movement of the lever, it bears upon a projecting stud on the side of the block, and draws it back with it against the pressure of the friction-spring, which, acting on the cam-shaped lower surface of the block, has hitherto held it closed. In some of these arms the motion of opening is facilitated by a friction-roll in the side of the breech-block against which the cam-lever may bear. (See page 322.)

Closed.—By reversing the movement of the lever.

Locked.—By the brace at the instant of closing, being thrown forward by the locking-brace spring, and falling under the breech-block until arrested by striking the truncated corner of the cam-lever. In case the locking-brace spring should fail to act, the locking-brace is carried forward by the hammer when the piece is fired.

Fired.—By a center-lock of the usual pattern, the point of the main-spring passing between the forks of the locking-brace spring. The hammer has, besides the full-cock and half-cock notches on which it can be loaded, a third notch on which it can be carried loaded without fear of accidental opening or discharge; the face of the hammer being off the firing-pin, and the breech being secured from opening by unintentional pressure on the thumb-piece, by the resistance afforded by the hammer to the withdrawal of the brace.

Extraction.—By a disk-like extractor swinging on the same center as the block, and provided with two diametrical arms, the upper of which is in contact with the front of the rim of the cartridge, and the lower of which is struck by a shoulder on the block in opening.

Ejection.—By accelerating the opening of the breech-block by the pressure of the friction-spring on its lower cam-shaped surface. In the act of withdrawing the lever, it engages with a pin projecting from the side of the firing-pin, and retracts it to an extent determined by the elongation of the hole in the side of the breech-block through which it passes.

Nos. 10 and 11 differ from No. 77 in having an extractor sliding under the barrel and moved by a shoulder on the breech-block. No. 10, besides, has no firing-pin retractor.

For convenience in assembling No. 77, a spring sear is pivoted in the side of the guard-strap, and when the locking-brace, by external means is pressed completely back, it engages with a notch in its under surface, and keeps it from bearing on the breech-block while this last is being removed. After re-assembling the piece, this spring-sear may be detached by opening the breech-block to its full extent.

WHITNEY SYSTEM, IMPROVED.

This is on the same general plan as the Whitney systems, Nos. 11 and 77.

Locked.—To secure the locking-brace from being forced back by the strain of an excessive charge, as it occurred with No. 77 in the experiments before the Board, a locking-lever is pivoted below the breech-block, its rear end being pressed upward by a spring lying beneath it, so that it may abut against the lower and front portion of the locking-brace when the piece is closed, and so lock it at the moment of the discharge.

This locking-lever may be depressed by cocking the hammer, so as to admit of the locking-brace being thrown back by the cam-lever, in the regular motion of opening the piece.

Dismounting.—A slight hook at the extremity of the locking-lever, is intended to be engaged with a corresponding notch in the under side of the locking-brace, when in dismounting the system, the locking-brace is pushed back by hand, so as not to hinder the removal of the breech-block by bearing against it.

Assembling.—In assembling the system the locking-brace is released from the locking-lever by opening the breech-block to its full extent, or by bringing the hammer to the full-cock.

The skeleton shown on the opposite page was the only specimen of this system presented.

WHITNEY SYSTEM, IMPROVED.

37 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

NINE *principal metallic parts not otherwise mentioned:*

8 Frame,
25 Hammer,
30 Breech Block,
27 Locking Brace,
28 Locking Brace Retractor,
32 Firing Pin,
11 Guard,
16 Trigger,
53 Extractor.

TEN *Screws:*

33 Firing Pin Screw,
36 Button Screw,
12 Guard Screw,
13 Guard Screw,
15 Friction Spring Screw,
19 Trigger Spring Screw,
21 Main Spring Screw,
54 Extractor Screw,
24 Recoil Stud Screw,
52 Tang Screw.

SIX *Pins:*

26 Hammer Pin,
31 Breech Block Pin,
29 Locking Brace Retractor Pin,
17 Trigger Pin,
20 Main Spring Friction Roll Pin,
10 Main Spring Stop Pin.

SIX *Springs:*

34 Firing Pin Spring,
14 Friction Spring,
18 Trigger Spring,
20 Main Spring,
22 Locking Brace Spring,
55 Locking Brace Retractor Spring.

FOUR *other minor parts:*

35 Button,
20 Main Spring Friction Roll,
23 Recoil Stud,
23 Recoil Stud Dowel Pin.

24 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
5 Butt Plate,
6 Butt Plate Screw,
7 Butt Plate Screw,
37 Tip,
38 Tip Screw,
39 Upper Band,
40 Upper Band Swivel,
41 Upper Band Swivel Scr.,
42 Upper Band Spring,
43 Lower Band,
44 Lower Band Spring,
45 Rear Sight Base,
46 Rear Sight Base Screw,
47 Rear Sight Spring,
48 Rear Sight Leaf,
49 Rear Sight Leaf Slide,
50 Rear Sight Leaf Slide Screw,
51 Rear Sight Joint Screw,
11 Guard Swivel and Pin,
9 Ramrod Stop.

WHITNEY, No. 13.

Five motions, viz: Cocked; opened; loaded; closed; fired.

Opened.—By bringing the hammer to the full-cock, a spring-hook retractor in front of it, catches and withdraws the locking-brace, which until this has been done, has been supporting the rear of the breech-block. The breech-block may then be drawn back by its projecting thumb-piece. As its descent is completed, a stud shown on its back strikes the retractor and detaches it from the locking-brace, which, under the influence of its own spring, is thrown forward and pressed against the back of the bolt until it is closed.

Closed.—By reversing the movement of the breech-block. The piece is locked against any accidental discharge in the act of closing, by the front end of the brace passing under the rear of the block, just as the latter is coming into place, until it is stopped by striking a shoulder formed on the lower surface of the block. It is still further secured, in case of the failure of the locking-brace spring to work, by the more complete entrance of the locking-brace under the block, from its being carried forward with the hammer when the piece is fired.

Fired.—By a center-lock of the usual pattern.

Extraction.—By a sliding extractor beneath the barrel, struck by a shoulder on the breech-block in the act of opening.

Ejection.—By accelerating the opening of the breech-block by the pressure of the friction-spring on its lower cam-shaped surface.

DEXTER, No. 38.

Five motions, viz: Cocked; opened; loaded; closed; fired.

Opened.—By half- or full-cocking the hammer, and then swinging down the breech-block by depressing the thumb-piece on the right side of the frame. This pushes back the firing-pin and the locking-brace, by the cam acting on the firing-pin retractor and locking-brace retractor respectively.

Closed.—By raising the thumb-piece, so as to swing the breech-block up into place. In so doing, the locking-brace is thrown forward by its spring, into place under the breech-block, as soon as the latter is closed.

Locked.—By the position of the locking-brace, the lower end of which abuts upon the guard.

Fired.—By a center-lock of the usual pattern.

Extraction and ejection.—By a revolving extractor, pivoted near the breech-block pin, and struck by the block in its descent. In opening the block the locking-brace is forced against the trigger, and is held there by the block; the hammer therefore, cannot be made to fall while the piece is opened.

28 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

Two *of Wood:*

2 Tip Stock,
3 Butt Stock.

THIRTEEN *principal metallic parts not otherwise mentioned:*

6 Frame,
7 Side Plate,
9 Breech Block,
10 Firing Pin,
13 Firing Pin Retractor,
14 Hammer,
19 Locking Brace,
11 Locking Brace Retractor,
21 Cam and Breech Block Pin,
22 Trigger,
23 Extractor,
24 Thumb Piece,
17 Main Spring Swivel.

SEVEN *Screws:*

38 Recoil Stud Screw,
8 Side Plate Screw,
12 Firing Pin Screw,
15 Hammer Screw,
25 Thumb Piece Screw,
27 Trigger & Locking Brace Spring Screw,
39 Tang Screw.

Two *Pins:*

18 Main Spring Swivel Pin,
20 Locking Brace Pin.

Two *Springs:*

16 Main Spring,
26 Trigger Spring and Locking Brace Spring.

Two *other minor parts:*

37 Recoil Stud,
37 Recoil Stud Dowel Pin.

22 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
5 Butt Plate,
35 Butt Plate Screw,
36 Butt Plate Screw,
28 Tip,
29 Tip Screw,
30 Upper Band,
32 Upper Band Spring,
31 Lower Band,
33 Lower Band Spring,
40 Rear Sight Base,
41 Rear Sight Leaf,
42 Rear Sight Joint Screw,
43 Rear Sight Leaf Screw,
44 Rear Sight Leaf Slide,
45 Rear Sight Spring,
46 Rear Sight Base Screw,
47 Upper Band Swivel,
48 Upper Band Swivel Scr.,
34 Ramrod Stop.

DEXTER, No. 38.

WHITTEMORE, No. 36.

Withdrawn before being photographed.

Three motions, viz: Opened; loaded; fired.

Opened.—Opened and cocked by drawing back a locking-piece, hinged to the hammer, and pressed against the frame by a spring lying between it and the hammer.

Closed.—Closed and fired by drawing the trigger, the mainspring being placed beneath the barrel.

Locked.—By the engaging of the locking-piece with a corresponding abutment on the frame, into which it is pressed by the locking-piece spring, just before the cartridge is struck by the hammer when the piece is fired.

Extraction.—By a hooked lever pivoted on the hammer, and moving bodily with it in the first instant of opening.

Ejection.—By striking the lower end of another similar lever pivoted to the side of the frame, by the end of the locking-piece, when the opening is nearly completed.

A flap hinged to the top of the barrel may be interposed between the head of the cartridge and the hammer, so that the piece may be carried safely when loaded; the upper portion of this flap is formed into a sight base.

MUIR-MONTSTORM, No. 60.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—The breech-block of this arm is moved by an outside lever, the interior shaft connected with which is cam-shaped, so that the first motion of opening draws down the breech-block, until a lip on its upper surface is clear of a hook or jaw formed on the under side of a projection of the frame overhanging the mouth of the chamber. By continuing the motion of the lever, the breech is fully exposed by the rotation of the block, the hammer at the same time being brought to the full-cock.

Closed.—By reversing the movement of the lever the breech is closed.

Locked.—The breech-block is locked by the abutment of the frame upon its back. The back is partly flattened near the lower corner. This flat surface coming in contact with the frame, as the block is raised to engage with the hook or jaw above referred to, prevents the rotation of the block until it is depressed by the regular motion of opening.

Fired.—The lock is essentially of the usual form of center-locks.

Extraction and ejection.—By a sliding extractor in the lower side of the barrel. Its under side is notched for the upper end of a lever, which is pivoted on the same pin as the hammer. This lever has two horizontal arms, which are struck by corresponding prongs on the lower side of the block, in opening the piece.

39 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

Two *of Wood:*

3 Tip Stock,
7 Butt Stock.

THIRTEEN *principal metallic parts not otherwise mentioned:*

19 Frame,
20 Side Plate, Right
21 Side Plate, Left
26 Guard Plate,
30 Breech Block,
31 Firing Pin,
34 Cam Shaft,
35 Lever,
37 Hammer,
38 Extractor,
39 Extractor Lever,
41 Trigger,
47 Main Spring Swivel.

SIXTEEN *Screws:*

4 Tip Stock Screw,
22 Side Plate Screw,
23 Side Plate Screw,
24 Side Plate Screw,
25 Side Plate Screw,
27 Guard Plate Screw,
28 Guard Plate Screw,
29 Tang Screw,
32 Firing Pin Nut,
40 Extractor Lever Screw,
43 Trigger Spring Screw,
44 Trigger Screw,
46 Main Spring Screw,
48 Main Spring Swivel Scr.,
49 Main Spring Swivel Scr.,
51 Spring Lever Catch Scr.

Two *Pins:*

2 Barrel Pin,
36 Lever Pin.

FOUR *Springs:*

33 Firing Pin Spring,
42 Trigger Spring,
45 Main Spring,
50 Spring Lever Catch.

Two *other minor parts:*

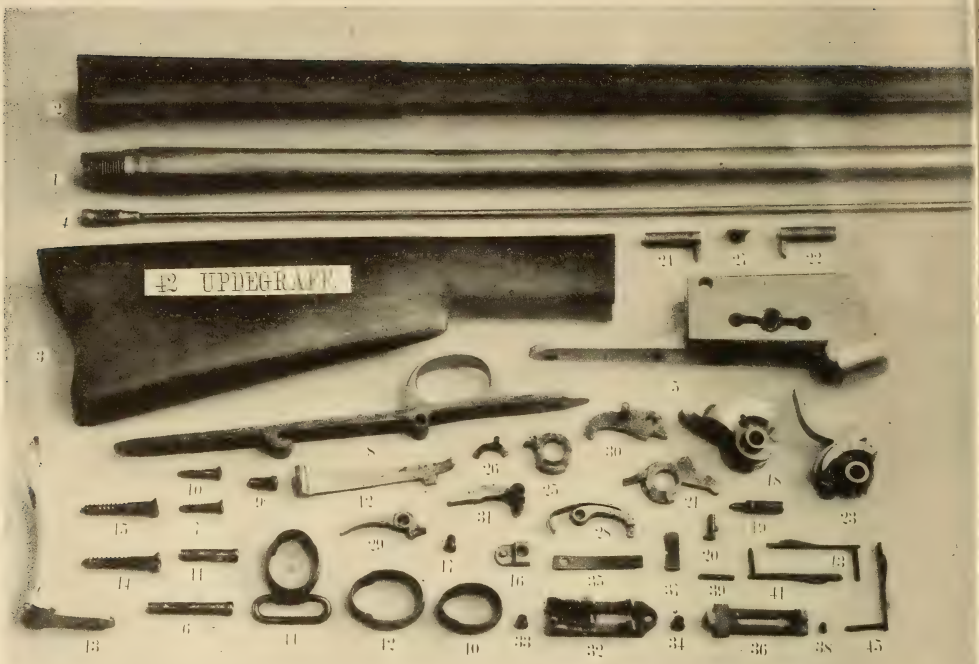
20 Side Plate, Right Dowel Pin,
21 Side Plate, Left Dowel Pin.

14 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
5 Tip,
6 Tip Screw,
8 Butt Plate,
9 Butt Plate Screw,
10 Butt Plate Screw,
11 Ramrod,
12 Ramrod Stop,
13 Lower Band,
14 Lower Band Spring,
15 Upper Band,
16 Upper Band Swivel,
17 Upper Band Swivel Scr.,
18 Upper Band Spring.

MUIR-MONTSTORM. No. 60.

60 MUIR—MONTSTORM.



30 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

Two *of Wood:*

2 Tip Stock,
3 Butt Stock.

Twelve *principal metallic parts not otherwise mentioned:*

5 Frame,
18 Breech Block,
19 Firing Pin,
20 Firing Pin Retractor,
23 Hammer,
25 Pawl,
8 Guard Plate,
11 Side Screw,
21 Extractor,
29 Trigger,
30 Hammer and Br'ch Block Links,
31 Hammer and Br'ch Block Links.

Six *Screws:*

27 Hammer and Br'ch Block Pin Screw,
9 Guard Plate Scr., Upper
10 Guard Plate Scr., Lower
6 Tang Screw,
7 Upper Butt Stock Screw,
17 Recoil Stud Screw.

Six *Pins:*

5 Lever Pin,
5 Lever Pin,
22 Breech Block Pin,
24 Hammer Pin,
26 Pawl Stop Pin.

Two *Springs:*

28 Friction Lever and Trigger Spring,
12 Main Spring.

Two *other minor parts:*

16 Recoil Stud,
16 Recoil Stud Dowel Pin.

22 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
13 Butt Plate,
14 Butt Plate Screw,
15 Butt Plate Screw,
40 Upper Band,
41 Upper Band Spring,
44 Middle Band, Swivel and Pin,
43 Middle Band Spring,
42 Lower Band,
45 Lower Band Spring,
32 Rear Sight Base,
33 Rear Sight Base Screw,
34 Rear Sight Base Screw,
35 Rear Sight Spring,
36 Rear Sight Leaf,
37 Rear Sight Leaf Slide,
38 Rear Sight Leaf Screw,
39 Rear Sight Joint Pin.

UPDEGRAFF, No. 42.

UPDEGRAFF, No. 42.

Four motions, viz: Opened; loaded; closed; fired.

Opened.—By bringing the hammer to the full-cock, a link connecting its under surface with that of the breech-block throws the latter down into the position of loading. The hammer when released moves forward to the half-cock notch, and changes its point of bearing on the block to the other side of the center of motion, by engaging with a second link like that above mentioned. As the breech-block opens, the firing-pin is withdrawn by an arrangement similar to that employed in No. 82, (R. L. R., model 1871.)

Closed.—By again bringing the hammer to the full-cock, the action of the link being reversed from the change of its bearing on the block. This can also be done by hand in the usual way.

Locked.—By the descent of the hammer beneath the block when the piece is fired.

Fired.—By a center-lock of the usual pattern; the trigger-spring being formed by a slit in the side of the friction-lever.

Extraction.—By a disk pivoted on a hub formed on the side of the breech-block, and provided with the necessary radial arms. This disk is recessed for the head of the firing-pin retractor, which it operates in the usual manner.

Ejection.—Is secured by accelerating the movement of the extractor, by a quick blow which it receives from the nearest link, at its release in the act of opening the piece.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER CLOSED BY A MOVABLE BREECH-BLOCK, WHICH ROTATES ABOUT A HORIZONTAL AXIS AT 90° TO THE AXIS OF THE BARREL, LYING BELOW THE AXIS OF THE BARREL AND IN FRONT.

2.—MOVED FROM BELOW BY A LEVER.

SPENCER.

BROUGHTON, No. 18.

ROBERTSON.

EVANS.

KIRK.

G. R. REMINGTON.

SPENCER, No. 30.

Five motions, viz: Opened; loaded; closed; cocked; fired.

Opened.—By depressing the lever it is caused to swing around the knuckle-joint in the breech-block in which it is imbedded, until the rear end of its body is disengaged from a corresponding notch in the back of the frame; the projecting lip in front of the body of the lever, then strikes the shoulder formed on the under surface of the breech-block, and both pieces revolve together about the axis of the block until the chamber is exposed. In depressing the lever, a notch in the upper side of the joint of the lever, engages with a corresponding notch in the lower side of the firing-pin, and thus retracts it. The back of the breech-block bears against the face of the hammer in opening, and brings it to the half-cock.

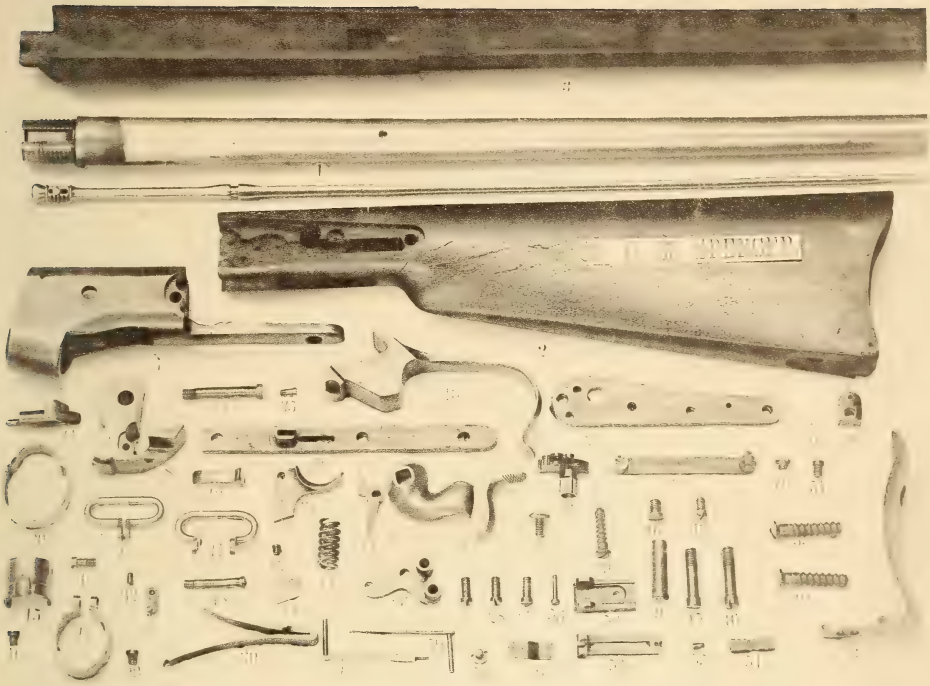
Closed.—By reversing the action of the lever, the block is pressed forward against the mouth of the chamber, where it is maintained by the action of the spiral-lever spring, which is inclosed between the face of the body of the lever and the block, and which keeps the rear end of the body pressed into its notch in the frame.

Locked.—By the support afforded the block, by the resting of the body of the lever-guard upon its notch in the frame.

Fired.—By a back-action side-lock of the usual pattern.

Extraction.—By an extractor sliding under the barrel, and having on its lower side a stud, playing in a groove in the hub of the breech-block.

Ejection.—By rapid motion of parts in opening.



39 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Butt Stock,
3 Tip Stock.

FOURTEEN *principal metallic parts not otherwise mentioned:*

8 Breech Block,
11 Breech Block Firing Pin Cap,
7 Frame,
13 Lever,
41 Firing Pin,
42 Extractor,
24 Lock Plate,
25 Hammer,
26 Bridle,
38 Trigger Plate,
44 Sear,
34 Trigger,
36 Tumbler,
31 Main Spring Swivel.

SIXTEEN *Screws:*

10 Breech Block Pin Screw,
12 Breech Block Firing Pin Cap Screw,
43 Extractor Screw,
45 Side Screw,
46 Side Screw,
27 Bridle Screw,
28 Bridle Screw,
29 Bridle Screw,
32 Main Spring Swivel Scr.,
33 Main Spring Stop Screw,
39 Trigger Plate Screw,
40 Trigger Plate Screw,
35 Trigger Screw,
37 Tumbler Screw,
51 Recoil Stud Screw,
23 Tang Screw.

ONE *Pin:*

9 Breech Block Pin.

TWO *Springs:*

14 Lever Spring,
30 Main Spring.

FOUR *other minor parts:*

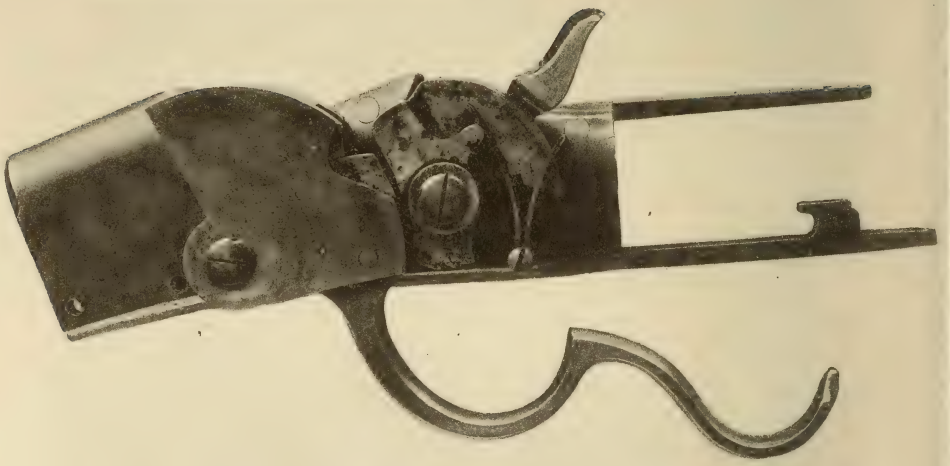
2 Side Screw Washer,
2 Side Screw Washer,
50 Recoil Stud Dowel Pin,
49 Recoil Stud.

24 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel and Front Sight,
4 Ramrod,
6 Butt Plate,
21 Butt Plate Screw,
22 Butt Plate Screw,
52 Rear Sight Base,
53 Rear Sight Leaf,
54 Rear Sight Leaf Slide,
55 Rear Sight Leaf Screw,
56 Rear Sight Joint Screw,
57 Rear Sight Base Screw,
58 Rear Sight Spring,
15 Tip,
16 Tip Screw,
17 Upper Band,
18 Upper Band Swivel,
19 Upper Band Swivel Scr.,
20 Lower Band,
59 Upper Band Spring,
60 Lower Band Spring,
47 Frame Swivel,
48 Frame Swivel Screw,
5 Ramrod Stop.

C. M. SPENCER, No. 30.

18 BROUGHTON.



32 PARTS PECULIAR AND ESSENTIAL TO THE SYSTEM.

TWO *of Wood:*

2 Tip Stock,
3 Butt Stock.

ELEVEN *principal metallic parts not otherwise mentioned:*

25 Breech Block, Right section,
26 Breech Block, Left section,
29 Firing Pin,
31 Lever,
36 Hammer,
41 Extractor,
37 Extractor Pinion,
42 Locking Brace,
43 Trigger,
47 Main Spring Swivel,
8 Frame.

TEN *Screws:*

27 Breech Block Screw,
28 Breech Block Screw,
34 Breech Block Pin Screw,
35 Hammer Pin Screw,
38 Extractor Pinion Screw,
40 Extractor Pinion Spring Screw,
44 Trigger Screw,
46 Main Spring Set Screw,
11 Tang Screw, Upper
12 Tang Screw, Lower

FOUR *Pins:*

32 Breech Block Pin,
48 Main Spring Swivel Pin,
51 Lever Pin,
33 Hammer Pin.

FIVE *Springs:*

52 Locking Brace Spring,
53 Locking Brace Spring,
30 Firing Pin Spring,
39 Extractor Pinion Spring,
45 Main Spring.

25 PARTS NOT PECULIAR TO THE SYSTEM, OR COMMON TO ALL ARMS.

1 Barrel, Front Sight and Recoil Stud,
4 Ramrod,
5 Butt Plate,
6 Butt Plate Screw,
7 Butt Plate Screw,
13 Upper Band,
23 Upper Band Spring,
14 Lower Band,
24 Lower Band Spring,
15 Band Swivel,
16 Band Swivel Screw,
49 Tip,
50 Tip Screw,
17 Rear Sight Base,
18 Rear Sight Leaf,
21 Rear Sight Leaf Slide,
22 Rear Sight Leaf Slide Scr.,
19 Rear Sight Spring,
20 Rear Sight Joint Screw,
9 Swivel Plate, Swivel and Pin,
10 Swivel Plate Screw.

BROUGHTON, No. 18.

BROUGHTON, No. 18.

Five motions, viz: Opened; loaded; closed; cocked; fired.

Opened.—By the first motion of depressing the lever, which is pivoted on the breech-block near its rearmost corner, its upper end presses back the locking-brace from under the block. It thus allows the block to swing downward and backward, as soon as by the continued motion of the lever, it strikes the under surface of the block so as to cause its revolution about the block-pin, and to expose the chamber for the insertion of the charge. As the locking-brace is pushed back it also brings the hammer to the half-cock.

Closed.—By reversing the motion of the lever, the locking-brace engages under the breech-block, the hammer remaining at the half-cock.

Locked.—By the locking-brace falling under the breech-block, as above mentioned.

Fired.—By a tang-lock of the usual pattern.

Extraction.—By a projection on the hub of the breech-block engaging with a sliding extractor underneath the barrel.

Ejection.—A rack on the extractor operates a pinion, the journal of which being cam-shaped, is acted on by a flat spring, so as to reciprocally accelerate the motion of the extractor, and thereby to forcibly expel the cartridge shell from the piece.

ROBERTSON, No. 35.

Five motions, viz: Opened; loaded; closed; cocked; fired. This arm was withdrawn without giving an opportunity for photographing it.

Opened.—By depressing the lever the block is pulled down by a link connecting the two.

Closed and locked.—By reversing the lever the block is raised into place against the end of the barrel, and is locked by the middle joint of the linked combination rising above the line joining the other two, and causing the strain upon the block from the discharge to tend towards bringing the lever more closely into place.

Extraction and ejection.—By a straight lever, swinging on a center below that of the block, and struck by the block during the opening, near its center of motion.

EVANS MAGAZINE, No. 1.

As a magazine, three motions, viz: Opened, closed, and fired. Withdrawn for alteration before an accurate description could be written or a photograph prepared.

The general principle is similar to that of the well-known Spencer repeater, save that the feed-motion is positive and is effected by the revolution of a fluted cylinder in the butt-stock. This cylinder holds the cartridges in its grooves, and revolves within a stationary helical coil of stout wire, the intervals of which are equal to the total length of the cartridge. Each motion of the lever in opening, being communicated through a pawl-like arrangement to the cylinder, gives it a partial turn, and causes the foremost cartridge to bear on the front surface of the coil next behind it, so that it shall be thrown out of the magazine into a position where it will be caught by the rising block, and passed into the

chamber of the gun. The motion of the lever also cocks the hammer, which is concealed.

The sample shown held thirty-eight small cartridges in a magazine running the length of the butt-stock, forming in itself the small of the stock, and loaded through a trap in the butt-plate. These were fired by a center-lock of the usual pattern, and the empty shells ejected through a hole in the side of the frame.

This arm could only be used as a single-loader, by replenishing the magazine from the rear, each time a shot was expended in front. Otherwise a gap in the succession of cartridges would occur, which could only be closed by repeated working of the lever as in firing.

KIRK, No. 37.

Withdrawn before being photographed.

It is a modification of the well-known Spencer repeating-rifle, containing in an unwieldy butt-stock, six magazine tubes instead of the single one usually carried. These are connected on a central spindle and revolved into place by hand.

G. R. REMINGTON, No. 55.

A wooden model of a triple barreled-gun, the locks complete being contained in the breech-block, which being lowered out of the way by the tang on its lower end, permits the insertion of the cartridges into the chambers through a perforated extractor-plate. This plate being moved by the arm on the pivot of the breech-block, withdraws the empty shells when the block is fully opened. A weak spring-catch in the stock holds up the tang of the breech-block when the piece is closed, and affords the only means of locking it.


55 G. REMINGTON.

BREECH-LOADING SMALL-ARMS HAVING A FIXED CHAMBER.

(*Obsolete.*)

SLEEPER.

WORRELL.

EDWIN SLEEPER, No. 1.

Wooden model.

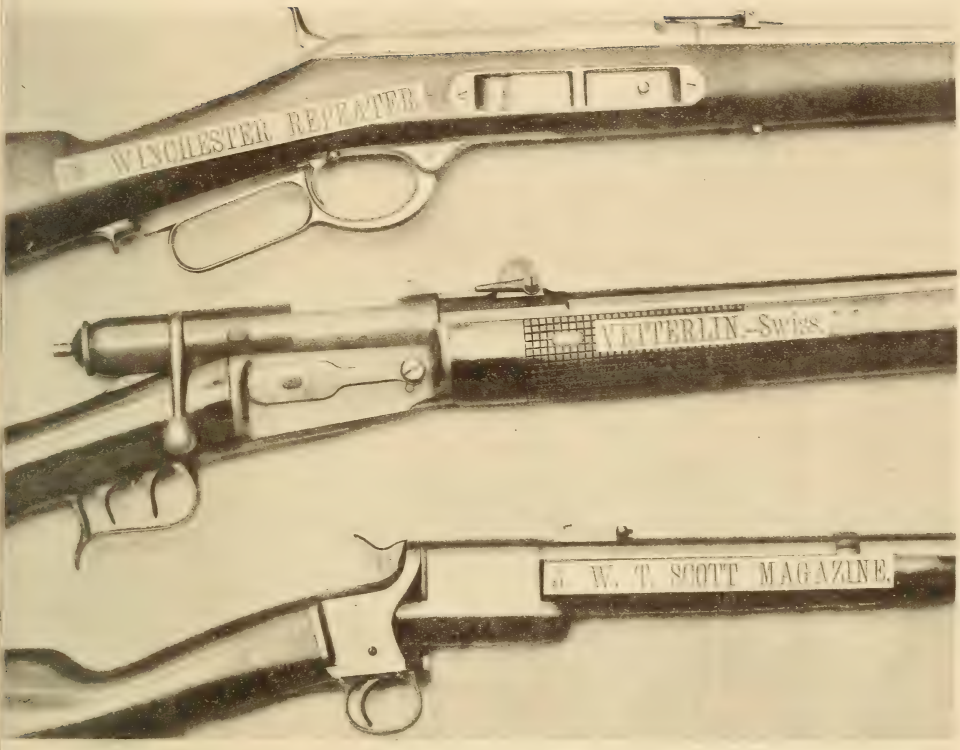
Opened.—By pressing an eccentric lever on the right side of the butt-stock, and thus throwing out the spring-butt-plate, so as to release the rear end of the chamber-lever, and to allow it to be thrown down by the spring included between it and the stock.

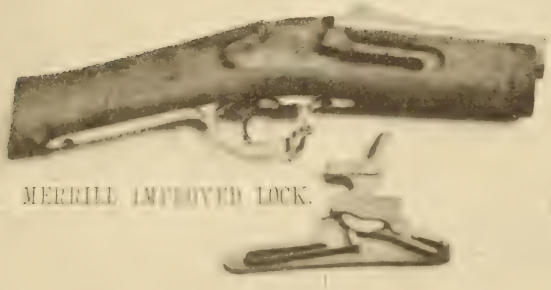
Closed.—By closing the chamber-lever until its rearmost end engages with the butt-plate, the forward end catches the cartridge, as would be done by a pair of tongs.

Lock, &c.: Rudimentary.

F. W. WORRELL, No. 6.

A wooden model consisting of a perforated block revolving in a mortised frame about an axis at right angles to its length. When closed the hole in the block lies in the prolongation of the bore. The model is without any indications of the means depended on for working it effectively.





2. MERRILL IMPROVED LOCK.

6 T. W. WORRELL.


5 SHARPS.
18 BROUGHTON.
63 PEABODY.
34 S. F. VAN CHOATE.
79 BROUGHTON.
45 BROUGHTON.


SPRINGFIELD.


Ward-Burton Magazine Musket.


80 ELLIOT.


SPRINGFIELD.


66 SPRINGFIELD-STILLMAN.


SPRINGFIELD-ALLEN.


26 WARD-BURTON.
48 SPRINGFIELD, MODEL 1870.
57 RUSSIAN BERDAN.
13 WHITNEY.
24 ELLIOTT.
61 LEE.


38 DEXTER.
67 REMINGTON RYDER.
21 REMINGTON LOCKING RIFLE.


11 WHITNEY.
86 REMINGTON RYDER EXTRACTOR.
54 LEE.


44 THOMAS.
32 W. S. SMOOT.
53 LEE.
82 Remington Locking Rifle, Model 1871.


NEEDLE-CARBINE.--German.
NEEDLE-GUN.--German.
Dreyse Improved Needle-Gun.--German.
MARTINI-HENRY.--English
ELCHO BAYONET.
83 MERRILL


12 LIESGART.


97 MUIR-MONTSTORM.
30 C. M. SPENCER.
40 JOSLYN-TOMES.


CHASSEPOT.--French.
MAUSER.- German.
15 MORGENSTERN
WERNDL.--Austrian.
WERDER.--Bavarian.
40 A. C. BEALLS

DEVICES FOR INCREASING THE FACILITY OR RAPIDITY OF FIRE FROM BREECH-LOADING MUSKETS AND CARBINES.

Colonel Benton's plans, No. 89 and 90.

R. T. Hare's plan.

Lieutenant Metcalfe's plan.

General Hagner's plan.

Ira Merrill's plan.

James Stillman's plans, No. 95 and 96.

Elliot Cartridge-box.

L. F. Bruce's Block-stop.

United States Service Cartridge-box.

Ira Merrill's Improved Side-lock.

COLONEL BENTON'S FIXED MAGAZINE, No. 89.

That portion of the stock just to the left of the receiver of a Springfield gun is enlarged so as to accommodate five cartridges, caliber .45. They are held in place by a lip on the side of the breech-block when the breech is closed, and when it is opened by the copper bushings described in No. 90.

COLONEL BENTON'S DETACHABLE CARTRIDGE-BLOCK, No. 90.

In reducing the lock-plate to the thickness shown in Springfield No. 69, a projecting bolster, (fig. 2,) is left at its forward end, and undercut in front and rear. On to this it is designed to slip a detachable magazine-block holding one row of six cartridges, and faced on the inner side with a plate of steel securely riveted to the body of the block, and containing a dovetail groove, (fig. 1,) corresponding to the bolster on the lock-plate. When fixed, the block is locked in place by a rotary cam on its inner surface, connected with a thumb-piece on the outside and turned by it so as to engage against the lower edge of the bolster. To unfix it, this thumb-piece is turned upward, leaving the block free to be slipped off. The cartridges are held in the block in case of its being accidentally overturned, by copper bushings with which the holes are lined. One side of these bushings, between two near and parallel slits, is bent inward so as to form a friction-spring, which is intended to bear against the cartridge with sufficient force to hold it against its own weight, and yet to permit its ready withdrawal by the hand.

This block is intended to be issued as a part of the soldiers' equipment, and to be carried full in the cartridge-box. To this end, additional protection against dropping the cartridges is afforded by a leather strap, fastened at the forward end of the blockand passing over the heads of the cartridges to a button on the other end of the block.

R. T. HARE'S DETACHABLE MAGAZINE, No. 93.

Consists of a block bored for any convenient number of cartridges in one row. On one side is fixed a leathern strap, Fig. 1, between which and the block the left hand is to be passed, the back of the hand being next to the block, and holding the block, as shown in Fig. 2, in a convenient position for loading.

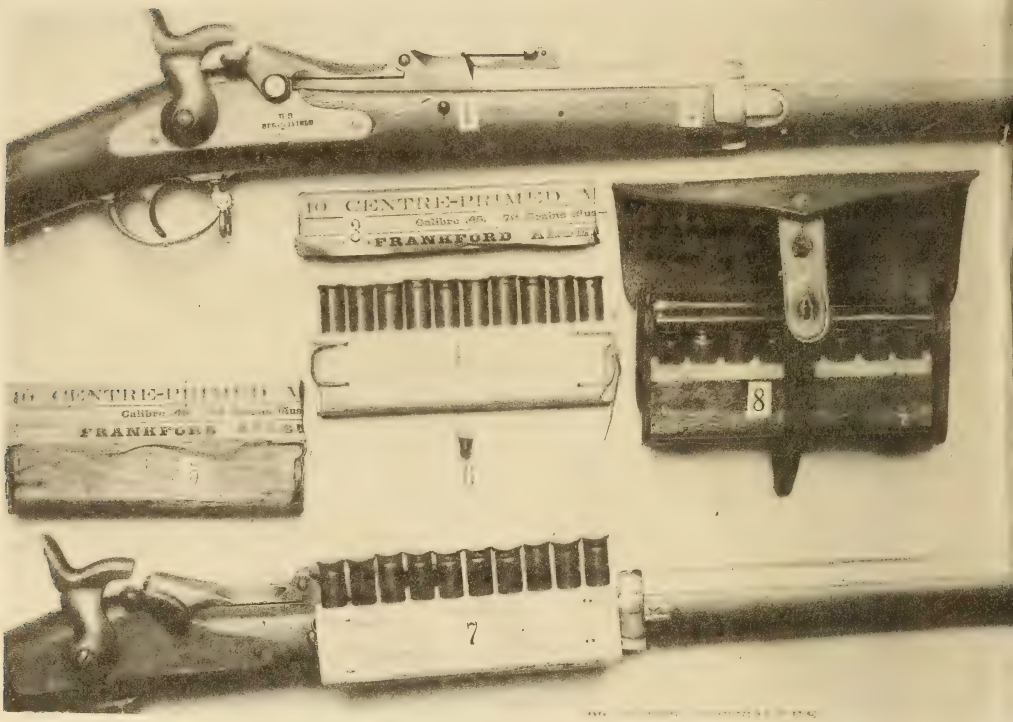
For convenience the block is curved, and the surface next the hand covered with sheep-skin. The cartridge-holes are bushed, as in No. 90. This block is also permanent in its nature, and intended to form a part of the soldiers' equipment.

89 Col. Benton's Fixed Magazine.

93 R. T. Hare's Detachable Magazine.

No. 98.

Lieut. Metcalfe's Detachable Cartridge Block.



1. Musket with Block unfixed; showing end of undercut Stay Pin.
2. Same: showing lip on Lower Band, and head of Band Key and Escutcheon.
3. Lid of Block, cut off by the string.
4. Body of Block.
5. Block complete.
6. Stay Pin; showing head cut to fit the under surface of the Receiver.
7. Block fixed on Musket, ready for firing.
8. Altered Cartridge Box, containing Three Blocks.

LIEUTENANT METCALFE'S DETACHABLE CARTRIDGE-BLOCK, No. 91.

This block is made of white-wood, bored to receive one row of eight cartridges, caliber .50, or of ten cartridges, caliber .45. It is chamfered at each end on one side, on which are iron-wire loops secured by passing through the block and clinching on the other side of it. The heads of the cartridges are protected by a paste-board cap, secured by a strip of paper pasted over its junction with the block, and overlying a string which is tied to the loop at the rear end of the block, and which passing completely around the row of cartridges, has its free end projecting sufficiently for an easy grasp of the hand. The forward one of these loops is curved and made of heavy wire, and is designed for insertion into a correspondingly curved cut in the lower band; the rearmost loop, of lighter wire has an indentation near its upper end, which is intended to be sprung into a notch in a stay-pin, projecting through a hole in the stock at the proper distance in rear of the band. The short bearing from this indentation upward on the loop, gives that portion of the wire a rigidity sufficient to put a stop to an undue descent of the block in fixing it on the gun, while the longer bearing below, allows the wire to spring out and in along its slanting profile, when the proper pressure is applied. The curved bearing of the forward loop prevents the block from coming off unless first raised at the hinder end. The cartridges are kept from accidentally dropping out, by making the holes a snug fit in the longitudinal direction, while undue sticking from lateral shrinking of the holes under the influence of moisture, is guarded against by a corresponding lateral elongation of the holes, made by allowing the drill in boring them a little play from side to side. These blocks are intended for only temporary use, being thrown away as soon as exhausted, and their place being supplied by fresh ones taken from the cartridge-box. This is provided with a metallic plate outside, to hold one block in a manner similar to that shown in the gun, while two more blocks are carried in a pouch within. The strap seen in the view of the cartridge-box, has its inner end fastened to the back of the box, and passes under the blocks carried inside, and over the block held by the metal plate without, to a button on the bottom of the box. It serves to raise the inside blocks into an accessible position, and by holding down the outside block, to permit the taking from it of single cartridges when desired. The block is fixed on the gun by engaging its forward end with the curved cut in the band, and then pressing down the hinder end until the indentation of the loop springs into place on the stay-pin. By then seizing the free end of the string and giving it a pull, it will cut through the paper, and at the conclusion of its course, throw off the paste-board cap; the cartridges can then be used at pleasure. In arms of the Springfield type the natural motion of opening the block brings the hand directly to the cartridge. The band is held against the shock of the recoil by a key passing through a recoil-stud on the barrel. The position of the block serves to guard the hand from burning in rapid and continuous firing.

NOTE.—In a later model of this block, the recoil-bearing is directly upon the key, which is placed in rear of the ordinary lower band. Its head is cut as in the band above described. Instead of the heavy wire loop at the forward end of the block, a piece of sheet-iron is tacked on. The holes in the wood are cylindrical, and of nearly the diameter of that portion of the cartridge at their upper edge. In case of shrinkage, this arrangement makes the surfaces in contact very small. After filling the block, it is varnished all over, to protect it from dampness.

IRA MERRILL'S MAGAZINE, No. 94.

The comb of the butt-stock is cut out in a groove deep enough to receive one cartridge, cal. .45, on end, and long enough to accommodate four or five of them side by side. A movable back for this groove is formed by a follower-block, which is pressed forward by a spiral-spring, carrying the cartridges ahead of it to the mouth of the magazine, from which they are to be picked out one by one. The magazine has a sliding cover by which, in traveling, the cartridges are to be kept from falling out.

GENERAL HAGNER'S FIXED MAGAZINE, No. 92.

A projection is formed on the under side of the stock between the lower band and the guard, in which three cartridges are placed, their heads being to the rear. They are held in place by means similar to those described in No. 90.

JAS. B. STILLMAN'S MAGAZINE, No. 95.

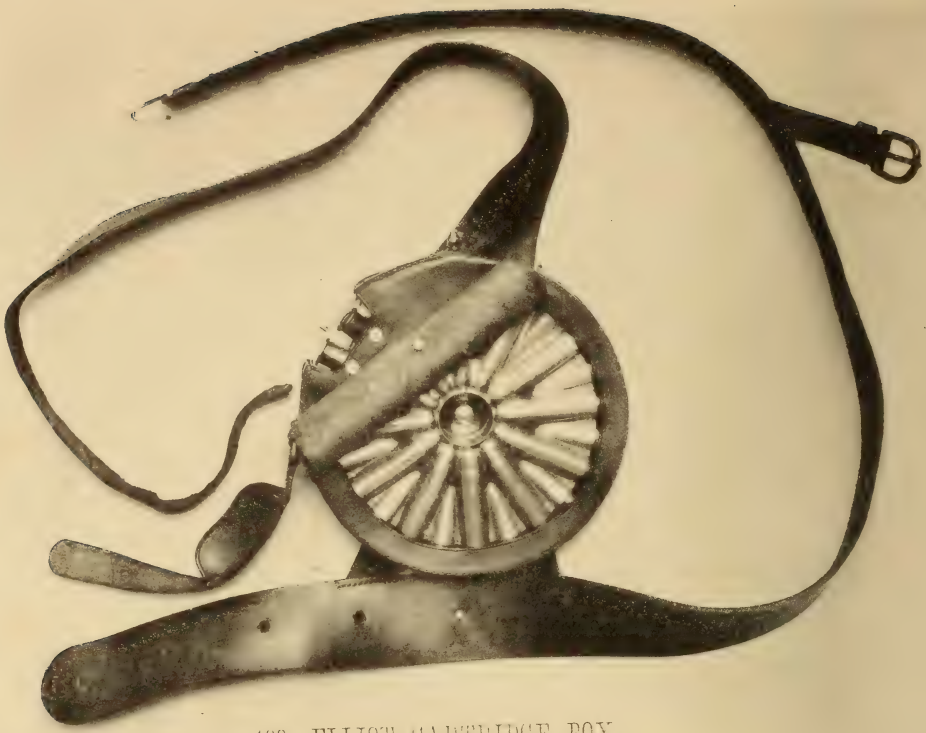
The comb of the butt-stock is counterbored for four musket cartridges, cal. .45. They are kept in place by a lid swinging backward, which is kept open when raised, and shut when closed, by a flat spring bearing on corresponding flat surfaces on the hinge. When the lid is raised the cartridges are kept from accidentally falling out by copper bushings, as in No. 90.

JAS. B. STILLMAN'S MAGAZINE, No. 96.

Like No. 95 except as to the motion of the lid, which swings sidewise in opening, and the forward end of which when closed, springs upward, from the elasticity imparted by its length, into a notch in the end of a plate let into the stock just in front of the cartridge-holes. To open it, the forward end is depressed until out of the notch, when the lid may be swung aside.


Ira Merrills Magazine.


Gen. Hagner's Fixed Magazine.



100 ELLIOT CARTRIDGE BOX.

ELLIOT CARTRIDGE-BOX, No. 100.

Consists of two metallic plates mounted side by side on a common pivot, by which they are secured in a skeleton metallic frame covered with leather. They are fluted radially for the reception of twenty-four musket cartridges, cal. .45. These flutings are so arranged, that the heads of the cartridges may lie in an almost continuous row, while the points overlap each other in such a manner, that the cartridges are mutually supported by the ends of their cases, the weight being thus taken off the point of the ball, and removing its liability to be driven into the cartridge by the repeated shaking of transportation. The box when used is to be worn over the left breast. When charged, it is rotated for firing, by bringing with the fingers each cartridge in succession to an open notch in the periphery of the frame, beyond which it is kept from going by the interposition of the end of the rim, which is here turned down into a flap and serves to stop its further motion in this direction. Its return is prevented by a spring-pawl on the underside of a slide on the circumference of the frame. This slide, when pulled out, as shown in the photograph, keeps the cartridge beneath it from accidentally falling out, and yet allows it to be used as a means of rotating the box, as soon as the cartridge next preceding has been picked out through the space left for its ready removal.

L. F. BRUCE'S STOP FOR SPRINGFIELD BLOCK.

This is intended to sustain the breech-block in the position of loading, when the muzzle of the gun is elevated, or the piece is much shaken, as on horseback at a trot. It consists of a spring and spindle like those used for the ejector, and lying in a counterbore on the opposite side of the receiver. When the block is open, the point of the spindle lies within a shallow cavity in the front surface of the hinge on the breech-block, and is pressed against it by the spring with sufficient force to hold it up, and yet to permit the pressure of the hand properly applied to easily close the piece.

UNITED STATES CARTRIDGE-BOX, No. 2.

The service cartridge-box shown in the preceding view consists essen tially of a leather pouch and flap. It is furnished with three rows of eight loops each, intended for the .50 cal. musket cartridge. These loops are made from continuous strips of webbing stiffened with shellac. Two rows of them are within the pouch and one without it, this last being covered by the flap when it is down. The end of the pouch is formed into a shallow pocket for the screw-driver. On its back are two loops through which the waist-belt passes.

MERRILL'S IMPROVED LOCK, No. 72.

A model of a side-lock, intended to dispense with the tumbler and adjacent parts and to be hermetically imbedded in the stock.

A modification of this was also shown in which the motion of the mainspring was arrested by a stop-pin after the hammer in falling had passed the half-cock notch. When applied to the Springfield system the act of raising the firing-pin guard in turning the cam-latch to open the block would be sufficient to easily overcome the friction and weight of the hammer and to bring it to the half-cock. In this lock there was no swivel, the mainspring pressing directly on the hammer.

(See photograph among group of assembled arms.)

DESCRIPTIONS OF TROWEL-BAYONETS AND INTRENCHING-TOOLS, AND OF ACCOMPANYING PORTIONS OF THE EQUIPMENT.

Rice's Trowel-Bayonet.

Chillingworth Bayonet.

Merrill's Trowel-Bayonet Handle.

Merrill's Upper Band.

Proposed Intrenching-Tool.

Proposed Trowel-Bayonet.

RICE'S TROWEL-BAYONET, No. 29.

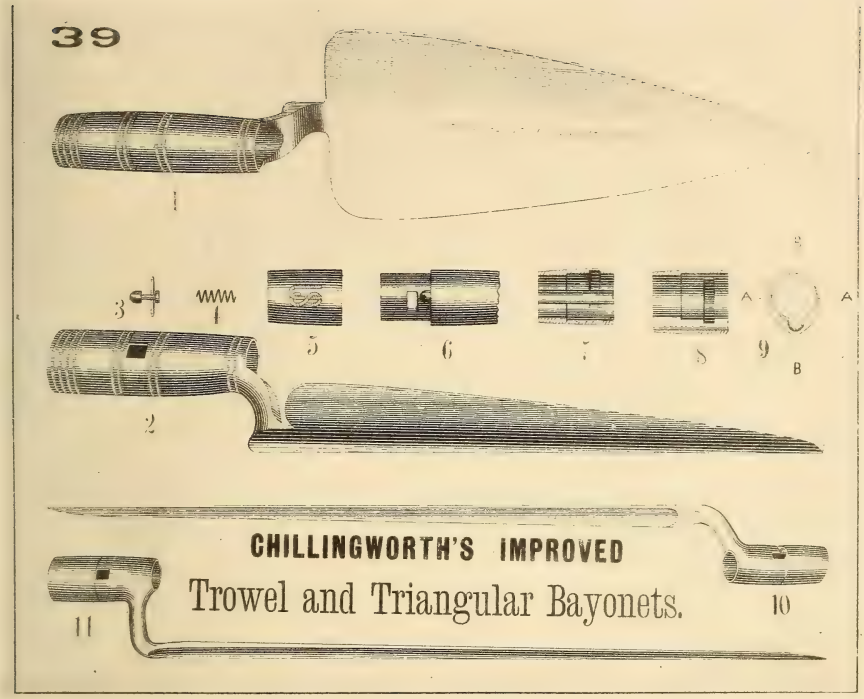
Consists of the ordinary musket-bayonet, the blade of which is shortened and welded to a thin curved triangular plate of steel. It is intended to be used as a trowel for intrenching purposes, being then detached from the musket; the loop connecting the shank and base of the blade serves as a stiffening brace, and also to guard the fingers from abrasion in the act of digging. A similar blade can be affixed to the ordinary sword-bayonet handle, which, though heavier than that first described, affords a more convenient grasp to the hand.

CHILLINGWORTH BAYONET, No. 39.

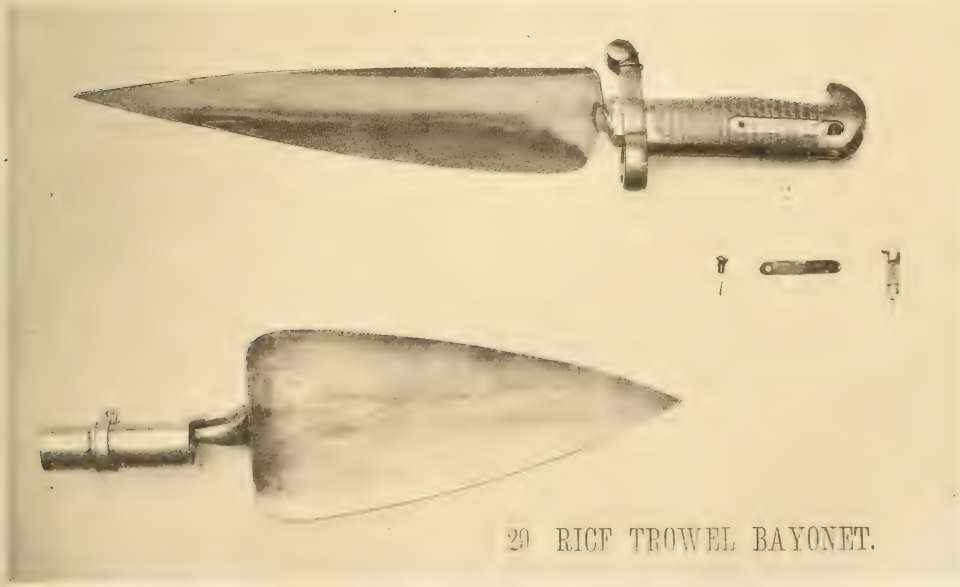
The peculiarity of the essential feature of this invention, viz, the handle, consists in its affording a more convenient grasp for the hand in digging, or in using it as a side-arm, than does the ordinary bayonet-socket, without materially increasing its weight or losing the advantages of a secure fastening when it is fixed as a pike upon the gun.

To secure this, beside the general shape of its profile, a shoulder is formed on the rearmost portion of the handle, Fig. 6. To it is fitted a short sleeve, (Figs. 5, 7, 8, 9,) along the bore of which is cut a deep groove, intended to admit the bayonet-stud, (Figs. 8, 9.) When in fixing the bayonet on the musket the bayonet-stud strikes the shoulder (Fig. 6) its longitudinal motion is arrested until the handle is turned so that the square notch (Fig. 2) comes opposite to and receives the bayonet-stud; by then turning back the sleeve to its original position, the bayonet is locked in place. The sleeve is retained upon the handle by means of the stud shown in Fig. 6, and the pin and spring seen in Figs. 3, 4, 6. By pushing back the pin through the bayonet-stud groove, (Figs. 8, 9,) the sleeve may be rotated until the stud which confines it comes opposite to the outlet of the internal circumferential groove in which it travels, the sleeve may then be slipped off. The catch-pin, shown in Fig. 3, is kept in place by a transverse wire, shown in the figure, and is pressed outward by the spiral spring.

The blade and handle of the trowel-bayonet are forged in one piece. The curved neck of the handle is intended to be used as a muzzle-rest in firing, the point of the bayonet being then stuck in the ground.

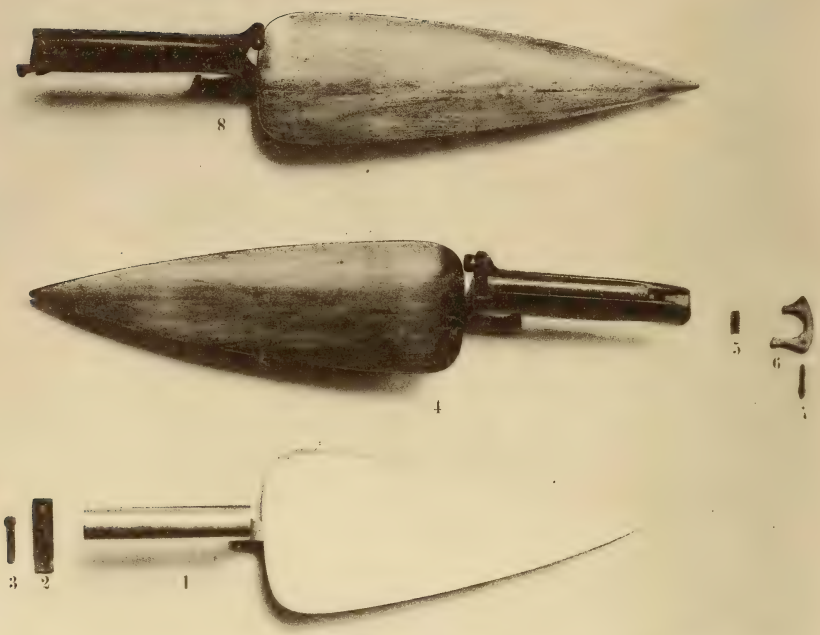


1.—Front view. 2.—Side view. 3.—Socket Friction Pin and Stop. 4.—Socket Friction Pin Spring. 5.—Socket Sleeve. 6.—Socket Arm Stud. 7.—Socket Sleeve, longitudinal section through line A. 8.—Socket sleeve, longitudinal section through line B. 9.—End view of sleeve. 10.—Triangular Bayonet, with sleeve turned to admit the Sight. 11.—Triangular Bayonet, side view.

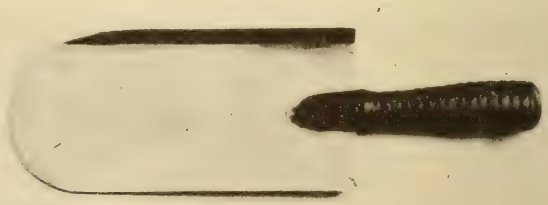


1.—Model '55 Socket and Clasp, with Finger Guard. 2.—Sabre Bayonet Handle. 3.—Sabre Bayonet Handle Spring. 4.—Sabre Bayonet Handle Spring Screw. 5.—Sabre Bayonet Handle Catch.

70 Merrill Trowel Bayonet Handles.



1.—Slide Catch. 2.—Slide. 3.—Friction Spring. 4.—Trowel Bayonet Handle. 5.—Catch Spring. 6.—Catch. 7.—Catch Pin. 8.—Trowel Bayonet Handle.



PROPOSED

Intrenching Tool and Trowel Bayonet.

71 MERRILL UPPER BAND.

1.—Proposed Intrenching Tool. 2.—Proposed Trowel Bayonet Handle. 3.—Upper Band, for stacking arms. 4.—Upper Band. 5.—Upper Band Swivel. 6.—Upper Band Swivel Screw.

MERRILL TROWEL-BAYONET HANDLE, No. 70.

The upper and lower specimens shown differ only in form. The essential feature of the device is a slide in the side of the handle, which being withdrawn allows the bayonet-stud to pass aside into the square notch prepared for it at the farther extremity of its L-shaped groove. It is securely kept there by pushing back the slide into its former position.

The middle specimen shown, is held on the gun by the engaging of the bayonet-stud, with a corresponding notch in a spring-catch swinging in a slot in the end of the handle. By pressing down the outer end of the spring-catch the shoulder on its forward extremity is passed above the bayonet-stud on the barrel, leaving the bayonet free to be withdrawn. In this specimen the groove in the handle is straight, and is undercut to fit the bayonet-stud, and the bayonet is still further secured on the gun by the muzzle passing through a corresponding hole formed in the guard.

PROPOSED INTRENCHING-TOOL.

The proposed intrenching-tool consists of a sheet-steel blade, turned up on one edge and slightly curved cylindrically near the point. It is set in a light wooden handle split for its reception, and securely riveted together through the tang of blade. In one form of the implement the lower edge shown in the illustration was cut into saw-teeth. This tool is intended for exclusive use as a mechanical implement. It was suggested by Colonel Clitz, United States Army, member of the Board.

PROPOSED TROWEL-BAYONET HANDLE.

This consists of the obsolete bayonet-socket 1822 model, slightly lengthened, having the shoulder in front of the bridge filled up and all other corners rounded off smooth to the hand. It is fitted to a trowel-blade of any approved form. It was designed with the belief that the exceptional use of the weapon as a bayonet permitted the clasp or its equivalent to be dispensed with. This model was devised by Lieutenant Metcalfe, Recorder of the Board.

MERRILL UPPER BAND, No. 71.

A device, clearly shown in the photograph, intended for dispensing with the necessity of the triangular bayonet in stacking arms. Submitted in connection with the trowel-bayonet, the use of which in digging, would deprive the muskets of the means of stacking them when necessarily set aside for this purpose.

INDEX

TO

DESCRIPTIONS OF ARMS, ETC.

SMALL-ARMS CALIBER BOARD.

REPORT

OF A

BOARD OF ORDNANCE OFFICERS,

CONVENED

UNDER SPECIAL ORDERS No. 107, DATED ADJUTANT GENERAL'S OFFICE, MAY 7, 1872,

FOR THE PURPOSE OF DETERMINING THE

PROPER CALIBER FOR SMALL-ARMS.

APPENDED TO THE REPORT OF THE BOARD FOR THE SELECTION OF A BREECH-SYSTEM FOR THE MUSKETS AND CARBINES OF THE MILITARY SERVICE.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1873.

WAR DEPARTMENT, ORDNANCE OFFICE,
Washington, February 6, 1873.

SIR: I have the honor to submit the report and accompanying papers of the Board instituted by S. O. No. 107, A. G. O., 1872, and of which Major J. G. Benton, Ordnance Department, is President, "to conduct a series of experiments with a view to the determination of the proper caliber for small-arms," and to recommend that this report, &c., be submitted to the Board on Small-Arms at Springfield, Massachusetts, of which General A. H. Terry is President, for its consideration and action in connection with the adoption of a breech-loading system for small-arms.

Respectfully, your obedient servant,
By order of the Chief of Ordnance:

S. V. BENÉT,
Major of Ordnance.

The HONORABLE SECRETARY OF WAR.

[*Indorsement.*]

WAR DEPARTMENT, *February* 8, 1873.

Respectfully referred to the Board in session at Springfield, Massachusetts, of which Brigadier-General A. H. Terry, U. S. A., is President, for its consideration and action in connection with the adoption of a breech-loading system for small-arms.

WM. W. BELKNAP,
Secretary of War.

REPORT.

[Special Orders No. 107.—Extract.]

WAR DEPARTMENT, ADJUTANT GENERAL'S OFFICE,
Washington, May 7, 1872.

1. A Board, to consist of Major J. G. Benton, Major T. J. Treadwell, and First Lieutenant William Prince, Ordnance Department, is hereby appointed to meet at Springfield Armory, Springfield, Massachusetts, May 13, 1872, or as soon thereafter as practicable, to conduct a series of experiments, with a view to the determination of the proper caliber for small-arms.

The Board will receive special instructions from the Chief of Ordnance, and make its report to him.

The junior member of the Board will record the proceedings.

* * * * * * *

By order of the Secretary of War.

E. D. TOWNSEND,
Adjutant General.

Official:

WM. D. WHIPPLE,
Assistant Adjutant General.

NATIONAL ARMORY,
Springfield, Massachusetts, May 14, 1872.

The Board met pursuant to the above order. Present, all the members.

The following letter of special instructions from the Chief of Ordnance was read by the President:

ORDNANCE OFFICE, WAR DEPARTMENT,
Washington, May 9, 1872.

SIR: You have received the order convening a Board "to conduct a series of experiments, with a view to the determination of the proper caliber for small-arms."

The Board will submit, for the approval of this Bureau, a programme of such experiments as in its judgment should be made.

As a long range is necessary in making the trials, they will be carried on at the Springfield Armory, where from one thousand yards to a mile range can be readily obtained.

The commanding officers of the Springfield Armory and the Frankford Arsenal will afford every facility and assistance of men, material, instruments, and products, that no delay or interruption may occur. The report should be made to this Bureau, if possible, not later than the 1st of October next. The report should contain not only every detail of the experiments, but a summary of the results, with the conclusions of the Board thereon.

The President of the Board is authorized to call the Board together from time to time, as the experiments require the presence of all the members.

Respectfully, your obedient servant,

By order of Chief of Ordnance:

S. V. BENÉT,
Major of Ordnance.

Major J. G. BENTON,
President of Small-Arms Caliber Board.

The Board then proceeded to examine the records and reports of the various experiments in reference to small-arm caliber heretofore made at the Armory, and at Frankford Arsenal, Philadelphia, and, after mature consideration of the same, recommended the following programme as best calculated to develop the facts necessary for arriving at the decision called for in the order convening the Board:

I. The calibers subjected to comparison with the service-caliber of .50″ to be .40″, .42″, and .45′.

II. The charges in the experiments to range from 65 to 80 grains.

III. The weight of bullets to range from 350 to 450 grains.

IV. The experiments to be directed, primarily, to determining accuracy, and flatness of trajectory; subsequent experiments in other directions to be limited to those calibers and conditions which shall have given satisfactory results in these two particulars.

V. The trial to include a thorough comparison with the performance of the best foreign military small-arms, to effect which the Department to be requested to furnish the Board two specimens of the most recent pattern of the Martini-Henry rifle, as used in the British service, and a similar number of the most recent improved rifles adopted by the French, Prussian, Austrian, and Swiss governments, together with one thousand rounds of ammunition appropriate to each of said arms.

The above programme was submitted to the Chief of Ordnance by the President of the Board in letter of May 16, 1872.

Adjourned.

NATIONAL ARMORY,
Springfield, May 17, 1872.

The Board met at 10 a. m. Present, all the members.

On suggestion of the President it was determined that the experiments on calibers should be prefaced by an investigation in regard to the comparative merits of straight and bottle-shaped cartridge-cases, and the depth to which the bullet should be inserted in the case. The straight cases to be fabricated at Springfield, and the bottle-shaped cases at Frankford Arsenal.

After arranging that experiments with short-lap cases, as compared with the usual lap, should be made with straight and bottle-shaped ammunition at the Armory and Arsenal, respectively, during the recess, the Board adjourned to meet at the call of the President.

JULY 4, 1872.

The Board met pursuant to the call of the President. Present, all the members.

The following communication from the Ordnance Office, approving the programme submitted by the Board at its May session, was submitted and filed

ORDNANCE OFFICE, WAR DEPARTMENT,
Washington, May 24, 1872.

SIR: I have to acknowledge the receipt of your letter of the 16th instant, embodying the programme for experiments as adopted by the Board, which is approved by this Bureau.

Every effort will be made to procure the arms as required by Par. V. I inclose a list of arms in the museum of this Office, from which you may select such as may be of use pending the procurement of the special arms required.

Very respectfully, your obedient servant,

By order:

S. V. BENÉT,
Major of Ordnance.

Major J. G. BENTON,
President Small-Arms Board.

A report of firing conducted at Springfield Armory, during the recess of the Board, with .40″ caliber straight-case ammunition, 350-grain bullet, smooth and *cannelured*, with various charges and systems of lubrication, was submitted.

These experiments had been made pending the construction of a gun chambered for the trial of short-lap ammunition, and are recorded in Appendix A, Table 1, Targets Nos. 1 to 31, inclusive.

A report of firing conducted at Frankford Arsenal, during the recess of the Board, with short-lap .45″ caliber bottle-shaped ammunition, as compared with similar ammunition having ordinary lap of case, was submitted, and is recorded in Appendix A, Table 3, Targets 7 to 27, inclusive.

The Board proceeded to the consideration of the experiments at the Armory, and found that, of the systems of lubrication used, that in the *cannelures* gave better results than the greased patch; and that the practice improved as the charge was reduced from 80, through 75 and 70, to 65 grains.

The lubrication with the *cannelured* bullet appearing, however, to be insufficient for accuracy in prolonged firing of 100 or more rounds, it was determined to prepare bullets with deeper *cannelures* (.02″ deep) and subject them to trial.

The Board then proceeded to the consideration of the results of trial of short-lap ammunition at Frankford Arsenal, and find that no superiority of accuracy appears to be gained by shortening the hold of the case upon the bullet, while obvious objections exist in respect to the capacity of the ammunition to resist the shocks of transportation and exigencies of service.

As, however, the gun used in the trial had not been especially chambered to derive all the benefit incidental to the exposure of the bullet, final decision as to the desirability of short-lap was deferred until the completion of a gun specially chambered for the purpose.

Adjourned.

JULY 5, 1872.

The Board met pursuant to adjournment. Present, all the members.

A form of chamber for testing short-lap .45″ caliber ammunition was determined upon and ordered made. (Gun No. 5, Appendix A.)

The deeply *cannelured* .40″ caliber bullet having been prepared as suggested at the last meeting, and made up with 65 grains of powder in straight cases, the Board proceeded to test it for accuracy at 500 yards.

Five targets, without cleaning, gave a mean absolute deviation of 12″.5 for the last target, and an average of 12″ for the five, with a corrected angle of 58′ 55″. (Appendix A, Table 1, Targets 32 to 36.)

The service-gun and ammunition on the same occasion gave a mean absolute deviation of 14″.8 from five targets.

Five targets with .45″ caliber *cannelured* bullet of 440 grains, with 75 grains of powder and bottle-shaped case, prepared at Frankford Arsenal, ordinary lap and lubricated like service, gave a mean absolute deviation of 10″.5, with a corrected angle of 1° 5′ 40″. (Appendix A, Table 3, Targets 2 to 6, inclusive.)

NOTE.—The above firings were, in reality, executed on the 5th and 6th of July, the guns being left fouled over night.

Adjourned.

JULY 6, 1872.

The Board met pursuant to adjournment. Present, all the members.

The firing, described as commenced on the 5th instant, was completed, with the results as stated.

The President stated that the .42″ caliber straight-chambered rifle, 18″ twist, would be ready for trial on Monday, the 8th instant, with ammunition consisting of 370-grained *cannelured* bullet, and charges of 70, 75, and 80 grains musket-powder. Also, that a .45″ caliber straight-chambered rifle was in course of preparation.

It was resolved that the reports of the experiments with bottle-shaped cartridges for .42″ and .45″ calibers, made at Frankford Arsenal, and submitted at the first session of the Board, be adopted as part of the record of that kind of ammunition in comparison with the straight chambers and ammunition now being fabricated for trial by the Board.

These reports, with their accompanying records, will, accordingly, be found in Appendix B.

Adjourned.

JULY 8, 1872.

The Board met pursuant to adjournment. Present, Major J. G. Benton and Lieutenant William Prince.

The Board proceeded to the trial of the .42″ caliber straight-chambered rifle, described at the last meeting; twist, 18 inches. (Appendix A, Gun No. 4.)

Straight-case cartridges, with charges of 70, 75, and 80 grains of

musket-powder, and a cylindro-ellipsoidal, *cannelured* bullet of 370 grains, lubricated only in the *cannelures*, were fired from this rifle at 500 yards—one target of 20 shots with each charge—the gun being cleaned after each target. (Appendix A, Table 2, Targets Nos. 1, 2, and 3.)

The lightest charge gave the best results, as heretofore found with the .40″ caliber, the 80-grain charge going quite wild after the first few shots. The whole trial indicated insufficient lubrication, the earlier shots in each target being good, and the practice rapidly deteriorating.

It was, accordingly, determined to fabricate a few cartridges with the bullets more deeply *cannelured*, and with 70-grain charges, for trial at the next meeting of the Board.

Adjourned.

JULY 9, 1872.

The Board met pursuant to adjournment. Present, Major J. G. Benton and Lieutenant William Prince.

The .42″ caliber cartridges with deeply *cannelured* bullets having been prepared as ordered, a target of 20 shots was fired at 500-yard range. (Appendix A, Table 2, Target No. 4.)

The results indicated a much-improved practice, with a mean absolute deviation of only 9″.26, and the gun apparently quite clean at the termination of the trial. Only a moderate number of these cartridges having been prepared, the trial was discontinued for the time, a sufficient number being ordered to make a full trial of their efficiency in protracted firing at a subsequent occasion.

The President stated the .45″ caliber straight-case rifle and ammunition would soon be ready for trial, together with a new series of .40″, .42″, and .45″ caliber rifles, with barrels lightened by reducing the walls to the thickness of those of the present Springfield rifle.

It was resolved that all trials for accuracy and trajectory should be limited to 500-yard range, until the experiments had narrowed the field down to two or three varieties of ammunition or rifling, when trials at 800 and 1,050-yard range should be made to complete the record.

It was resolved that the .45″ caliber rifle for testing short-lap ammunition, chambered as suggested at the meeting of July 4, and ordered at meeting of July 5, be sent to Frankford Arsenal on completion; and that further trial of short-lap ammunition be made at that post and reported at the next session of the Board.

It was also resolved that, where time could be saved and the business of the Board facilitated by trials of proposed guns and ammunition at Frankford Arsenal between sessions of the Board, such trials should be so made, and reported at the next subsequent session; the President to send to Frankford Arsenal such of the proposed guns and cartridges as he deemed could be best tested with the facilities at that post.

The Board then adjourned to convene again at the call of the President.

NATIONAL ARMORY,
Springfield, Massachusetts, November 28, 1872.

The Board met pursuant to call of the President. Present, all the members.

Experimental firing, in accordance with the resolution of the Board, had been progressing at the National Armory since the last meeting, under direction of the President of the Board, assisted during a portion of the interval by the junior member.

The President stated that the following foreign arms and ammunition had been received in response to the request contained in the programme forwarded to the Ordnance Office May 16, 1872. (Folio 352.)

Two Martini-Henry rifle-muskets, with a supply of complete cartridges.

One Vetterlin (Swiss) rifle-musket, with complete cartridges.

One Werndl (Austrian) rifle-musket, with primed cases and bullets.

One Needle (Prussian) rifle-musket, with primed sabots.

One Beaumont (Dutch) rifle-musket, with complete ammunition.

Two Berdan (Russian) guns, with ammunition, were already available by the Board.

The absence of a French arm and Prussian ammunition, were accounted for by the fact that France has at present no distinctively national arm, and that Prussian ammunition is in a transition state from the paper sub-caliber cartridge formerly used to metallic ammunition for a different breech-loader.

These arms and cartridges are described in Appendix A, under the following numbers:

RIFLES.

Martini-Henry, (English,) No. 17.
Vetterlin, (Swiss,) No. 18.
Werndl, (Austrian,) No. 19.
Needle, (Prussian,) not tested.
Beaumont, (Dutch,) No. 6.
Berdan, (Russian,) No. 7.

CARTRIDGES.

Martini-Henry, (English,) No. 51.
Vetterlin, (Swiss,) No. 52.
Werndl, (Austrian,) No. 53.
Beaumont, (Dutch,) No. 31.
Berdan, (Russian,) No. 32.

The Board proceeded to the consideration of the performance of such of the foreign arms and cartridges as had been tested during the interval since their last session, and found none of them worthy of further trial in comparison with the experimental calibers under investigation,

except the Martini-Henry and the Russian-Berdan. Their mean absolute deviations at 500 yards were as follows:

Martini-Henry, 10″.3, (Appendix A, Table 3, Nos. 68 to 72.)
Russian-Berdan, 12″.8, (Appendix A, Table 2, Nos. 5 to 12.)
Beaumont, (Dutch,) 16″.4, (Appendix A, Table 3, Nos. 32 to 44.)
Vetterlin, (Swiss,) 22″.6, (Appendix A, Table 2, Nos. 41 to 45.)
Werndl, (Austrian,) wild, (Appendix A, Table 2, Nos. 46 to 50.)

Adjourned.

NATIONAL ARMORY,
Springfield, Massachusetts, November 29, 1872.

The Board met at 9 a. m., pursuant to adjournment, and proceeded to consider the records of various modifications of the .40″, .42″, and .45″ caliber barrels made during the intermission.

In the .40″ caliber the following firings were submitted:

1st. Trials of three different lengths of the straight-case cartridge with 340-grain bullet and 65-grain charge, the case covering three, four, and five *cannelures* of the bullet, respectively, as described under Nos. 44, 45, and 46, (Appendix A, Descriptions of Ammunition,) the object being to get as short a .40″ caliber cartridge as possible, consistently with good practice and a charge of 65 grains. These cartridges were tried in 18″ twist barrels, with throats shortened proportionately to the shortened cartridges, and the barrels lightened by reducing their walls to thickness of the service .50″ caliber rifles.

The barrels are described in Appendix A, under Nos. 9, 13, and 14, "Descriptions of Arms."

Gun No. 9, with a full length chamber and lightened barrel, gave, with the shortened cartridge, a mean absolute deviation of 16″.7 from three targets. (Appendix A, Table 1, Targets Nos. 50 to 52.)

Gun No. 14, with medium length chamber and medium cartridge, gave 19″.8 from five targets. (Appendix A, Table 1, Nos. 58 to 62.)

Gun No. 13, with short chamber and short cartridge, gave 10″.4 from five targets. (Appendix A, Table 1, Nos. 53 to 57.)

The last gun, (No. 13,) with its ammunition, (No. 46,) was selected as the representative gun and cartridge of this caliber.

Its trajectory for 1,050 yards and intermediate ranges was presented as constructed from firings at every hundred yards, from one hundred to one thousand.

The firings for the angles of elevation, required to construct this trajectory, had been executed from the shoulder to avoid the complications produced by the strains and vibrations of a fixed rest.

It was resolved that these angles should stand on the record as those of this gun and cartridge. They were as follows:

	Angle of sight
For 100 yards	2′ 40′
For 200 yards	13′ 45″
For 300 yards	27′ 8″
For 400 yards	37′ 43″
For 500 yards	56′ 20″
For 600 yards	1° 15′ 26″
For 700 yards	1° 32′ 8″
For 800 yards	1° 53′ 8″
For 900 yards	2° 11′ 22″
For 1,000 yards	2° 37′ 6″

The mean absolute deviations at long ranges for this caliber were found to be—

For 800 yards, 24″.5.

For 1,050 yards, 49″.0.

(Appendix A, Table 1, Targets Nos. 82, 83, 88, 89, and 90.)

Initial velocity, 1,387.7 feet per second.

Pressure 19,900 pounds per □″.

(Appendix A, Table 5, Nos. 21 to 30.)

Penetration in pine boards at 500 yards, average of ten shots, 8″. (Appendix A, Table 6, No. 1.)

In connection with this caliber (.40″) a barrel, rifled on the Henry principle of the Martini-Henry rifle, had been constructed and tested with full-length .40″ caliber cartridges. This gun is described as No. 12 in Appendix A, "Descriptions of Arms." Its performance, though fair, did not indicate any superiority over that of the three plain grooves of the other barrels. The mean absolute deviation at 500 yards was 13″.1, as derived from seven targets. (Appendix A, Table 1, Nos. 37 to 43.)

It was resolved to give a final trial to this caliber as exemplified in gun No. 13 and cartridge No. 46, they being the best .40″ caliber forms developed by the trials, and 200 more cartridges were accordingly ordered.

Adjourned.

NATIONAL ARMORY,
Springfield, Massachusetts, November 30, 1872.

The Board met, pursuant to adjournment, at 9 a. m., and proceeded to the consideration of the records of the .42″ caliber trials.

In this caliber the following firings were submitted:

Conformably with resolution of July 9 in reference to further trial of more deeply *cannelured* bullets, four targets had been fired on the 11th of July with such bullets and charges of 60, 65, 75, and 80 grains, with steadily decreasing accuracy as the charge was increased. The mean absolute deviations at 500 yards were as follows:

60-grain charge, 6″.9, (Appendix A, Table 2, No. 16.)
65-grain charge, 9″.07, (Appendix A, Table 2, No. 13.)
75-grain charge, 19″.2, (Appendix A, Table 2, No. 14.)
80-grain charge, 26″.5, and 3 misses. (Appendix A, Table 2, No. 15.)

The elevation required for the smallest charge, however, was greater than was deemed admissible, and further trials were confined to 65-grain charges. Of these a series of five targets were fired July 18, with a mean absolute deviation at 500 yards of 9″.96. (Appendix A, Table 2, Nos. 17 to 21.)

Another series of five targets, with a lightened barrel and longer twist, (20″,) was fired, August 31, with a mean absolute deviation at 500 yards of 13″.8. (Appendix A, Table 2, Nos. 22 to 26.)

Another series of five targets, with the same gun as the last, the cartridges shortened .1″ by deeper insertion of the bullet, was fired, September 9, with a mean absolute deviation of 12″.1. (Appendix A, Table 2, Nos. 27 to 31.)

Subsequent experiments with cartridges still further shortened and a gun with chamber shortened to correspond were conducted, during September and October, and gave a mean absolute deviation at 500 yards of 14″.6. (Appendix A, Table 2, Nos. 32 to 40.)

The angles of sight for various ranges, as determined by shoulder-firing for the purpose of constructing a trajectory, were as follows:

	Angles of sight.
For 100 yards	10′ 6″
For 200 yards	21′ 54″
For 300 yards	34′ 4″
For 400 yards	53′ 32″
For 500 yards	1° 8′ 8″
For 600 yards	1° 26′ 23″
For 700 yards	1° 47′ 3″
For 800 yards	2° 7′ 43″
For 900 yards	2° 34′ 27″
For 1,000 yards	3° 6′ 20″

The mean absolute deviations for long ranges were found to be as follows:

For 800 yards, 22″. (Appendix A, Table 2, No. 69.)

For 1,050 yards, 44″.6. (Appendix A, Table 2, Nos. 72 to 75.)

Initial velocity, 1,312.5 feet per second. (Appendix A, Table 5, Nos. 11 to 20.)

Pressure, 16,250 pounds per □″. (Appendix A, Table 5, Nos. 11 to 20.)

Penetration in pine boards at 500 yards, average of 10 shots, 8″.55. (Appendix A, Table 6, No. 2.)

A diagram of the trajectory, founded upon the above angles, was submitted as in the case of the .40″ caliber.

As, however, the convexity of the trajectory and the angles of elevation somewhat exceeded the limits that were deemed desirable, some targets were fired with charges of 70 and 75 grains in comparison with 65 grains.

The former trials with these heavier charges having been confined to bullets with shallow *cannelures* and consequent inadequate lubrication, it was hoped that, with the deeply-grooved bullet, the increase of charge might be unattended by the deterioration of practice heretofore experienced, while at the same time flattening the trajectory.

The results were as follows, from three targets at 500 yards, fired with 65, 70, and 75 grain charges, respectively:

	M. Abs. Dev.	Angle of sight.
65-grain charge	10″.0	1° 13′ 38″
70-grain charge	16″.9	1° 7′ 38″
75-grain charge	20″.1	1° 5′ 28″

(Appendix A, Table 2, Nos. 51 to 53.

With the hope that an increased length of twist might enable the 70-grain charge to give a better mean absolute deviation, a barrel, (No. 20, "Descriptions of Arms,") was prepared, similar in all respects to the one last used, (No. 15,) except the twist, which was lengthened from 20″ to 24″. A series of five targets from this barrel gave a mean absolute deviation of 12″.8, with an angle of sight of 1° 4″ 7′. (Appendix A, Table 2, Nos. 54 to 58.)

It was resolved to give a final trial to this caliber, as exemplified in gun No. 20 and cartridge No. 54, those being the best 42′caliber forms developed by the trials, and 200 more cartridges were accordingly ordered.

Adjourned.

NATIONAL ARMORY,
Springfield, Massachusetts, December 2, 1872.

The Board met at 9 a. m., pursuant to adjournment, and proceeded to consider the records of .45″ caliber experiments made during the intermission.

Under this caliber the Board considered the performance of the following forms of barrels and ammunition.

With bottle-shaped cartridges, a series of four targets, at 500 yards, with short-lap ammunition, (No. 29,) had been fired at Frankford Arsenal, with a gun (No. 5) chambered specially for such cartridges, as directed

at the last meeting of the Board, (July 9, 1872,) with the following results:

Mean absolute deviation, 12″.0; corrected angle of sight, 1° 2′ 50″. (Appendix A, Table 3, Nos. 28 to 31.)

With straight-case cartridges a series of firings had been made at Springfield Armory with an 18″ twist barrel, (No. 8,) to determine the best weight of charge for this caliber, with the following results as regards accuracy:

Mean absolute deviation at 500 yards:

60-grain charge	12″.7
65-grain charge	11″.3
70-grain charge	9″.9
75-grain charge	13″.1
80-grain charge	12″.1

(Appendix A, Table 3, Nos. 45 to 49.)

The 65 and 70 grain charges appearing to give the best results, a series of four targets with each was subsequently fired, with the following mean absolute deviations at 500 yards:

65-grain charge, (No. 39)	12″.2
70-grain charge, (No. 40)	12″.4

(Appendix A, Table 3, Nos. 50 to 57.)

The performance being so nearly equal, the stronger charge was selected for further trials.

A reduction in length of the cartridge was tried, as in case of the smaller calibers, by inserting the bullet to a depth which would cover all the *cannelures*, reducing the length by .1″. (Ammunition No. 47 Appendix A.)

A series of five targets, with this ammunition, was fired from a gun (No. 11, Appendix A) suitably chambered and with a 22″ twist, with the following mean absolute deviation at 500 yards: 11″.1. (Appendix A, Table 3, Nos. 58 to 62.)

It being found that the ammunition could sustain still further shortening, without undue compression of the charge, a cartridge (No. 50, Appendix A) was prepared, having not only the bullet inserted to cover all the *cannelures*, but the case itself shortened a further .2″, making the total length of the cartridge 2″.5.

A series of five targets was fired with this ammunition from a gun (No. 16, Appendix A) suitably chambered and with a 22″ twist, with the following mean absolute deviation at 500 yards: 10″.6. (Appendix A, Table 3, Nos. 63 to 67.)

A trajectory of this latter ammunition was submitted which had been constructed from the following angles of sight, obtained for every 100 yards up to 1,000, by firing from the shoulder and rest, as in the previous calibers:

	Angles of sight.
100 yards	17′ 17″
200 yards	24′ 6″
300 yards	38′ 56″
400 yards	54′ 45″
500 yards	1° 12′ 31″
600 yards	1° 26′ 23″
700 yards	1° 46′ 34″
800 yards	2° 4′ 4″
900 yards	2° 32′ 1″
1,000 yards	3° 2′ 14″

The mean absolute deviations for long ranges were as follows:

For 800 yards, 24″.2. (Appendix A, Table 3, No. 103.)

For 1,050 yards, 57″.0. (Appendix A, Table 3, No. 114.)

Initial velocity, 1,300′.2 per second; pressure 16,300 pounds per □″. (Appendix A, Table 5, Nos. 31 to 40.)

Penetration in pine boards at 500 yards, average of 10 shots, 6″.8. (Appendix A, Table 6, No. 3.)

In regard to short-lap cases the Board was of the opinion that no superiority was exhibited which would compensate for the objectionable features incident to that mode of constructing a cartridge, and that the aggregate records indicate the general superiority of straight over bottle-shaped cases and chambers.

It was resolved to give a final trial to calber .45″, as exemplified in gun No. 16 and cartridge No. 50, those being the best .45″ caliber forms developed by the trials, and 200 more cartridges were accordingly ordered.

In the matter of .50″ caliber service-cartridges, many targets had been fired, in the course of experiments on smaller calibers, which corroborated in their general average the figures contained in the official pamphlet on that gun, made up from the results of many thousand rounds fired at the National Armory.

It was accordingly resolved that the figures of that record be used for purposes of comparison, as being founded on a much more extended basis of facts than the Board could possibly accumulate.

These figures are as follows:

Mean absolute deviation at 500 *yards*, 13″.1.

	Angles of sight.
100 yards	18′ 00″
200 yards	30′ 00″
300 yards	48′ 29″
500 yards	1° 19′ 56″
700 yards	2° 19′ 48″
900 yards	3° 00′ 00″
1,000 yards	4° 00′ 00″

Mean absolute deviations for long ranges.

700 yards	9″.22
1,050 yards	32″.07

Initial velocity, 1,240 feet per second.

Pressure, 12,000 pounds per □″.

Penetration at 500 yards, in white-pine boards, 8″.5.

As might be expected from the weight of the bullet (450 grains) the trajectory of the service-cartridge is much more convex than any of the small-caliber cartridges tried.

Adjourned.

NATIONAL ARMORY,
Springfield, Massachusetts, December 3, 1872.

The Board met at 9 a. m., pursuant to adjournment. Present, all the members.

A series of five targets, each at 500 yards, had been fired from the two foreign arms which had been selected for comparison at the meeting of November 28, viz, the "Martini-Henry" and the "Russian-Berdan."

The results were as follows, fired in perfect calm:

"Martini-Henry," (English,) caliber .45″: mean absolute deviation, 9″.1; corrected angle of sight, 1° 8′ 9″. (Appendix A, Table 3, Targets Nos. 73 to 77.)

"Russian-Berdan," caliber .42″: mean absolute deviation, 14″.9; corrected angle of sight, 59′ 57″. (Appendix A, Table 2, Targets Nos. 64 to 68.)

A series of five shots, with the .42″ caliber ammunition, (No. 54,) ordered for final trial in gun No. 20, at meeting of November 30, had also been fired December 3, and gave the following results at 500 yards:

Mean absolute deviation, 12″.9; corrected angle of sight, 1° 4′ 5″. (Appendix A, Table 2, Targets Nos. 59 to 63.)

The successive targets of Russian-Berdan indicated defective lubrication as in previous trials.

The President of the Board stated that he was ordered on special duty at Boston, which would require him to leave for that city to-day.

It was accordingly resolved that the results of the two calibers remaining for final trial should be communicated to the other members of the Board by mail, when, if no anomalous features were developed, the Board would be in a condition to report.

Adjourned.

FRANKFORD ARSENAL, *December* 12, 1872.

The President submitted to the Board the results of firing a series of five targets at 500 yards with the .40″ caliber gun (No. 13) and ammunition, (No. 46,) they being the forms selected for final trial as the best of their caliber, at meeting of November 29, 1872.

These targets were fired December 4, 1872, with the following results:

Mean absolute deviation, 15″.7; corrected angle of sight, 59′ 55″. Wind strong from left rear. (Appendix A, Table 1, Nos. 67 to 71.)

A series of five targets at 500 yards had also been fired with the .45″ caliber gun No. 16 and ammunition No. 50, they being the forms selected for final trial as the best of their caliber at meeting of December 2, 1872. The results submitted by the President were as follows:

Mean absolute deviation, 13″.7; corrected angle of sight, 1° 5′ 16″. Wind stiff to light from right rear. (Appendix A, Table 3, Nos. 78 to 82.)

A target of twenty shots had been fired at 800 yards, with each of the following guns and cartridges:

Results as follows—day calm:

Cal. .45″, gun No. 16, cartridge No. 50. Mean absolute deviation, 26″.5, and 1 miss; corrected angle of sight, 2° 31′ 27″. (Appendix A, Table 3, No. 104.)

Cal. .45″ Martini-Henry gun and ammunition: Mean absolute deviation, 24″.2 and 3 misses; corrected angle of sight, 2° 24′ 39.″ (Appendix A, Table 3, No. 105.)

Cal. .42″, gun No. 20, cartridge No. 54: Mean absolute deviation, 21″.8 and 2 misses; corrected angle of sight, 2° 11′ 15″. (Appendix A, Table 2, No. 70.)

Cal. .42″, Russian-Berdan gun and ammunition: Mean absolute deviation, 26″ .7 and 7 misses; corrected angle of sight, 2° 7′ 3″. (Appendix A, Table 2, No. 71.)

Cal. .40″, gun No. 13, cartridge No. 46: Mean absolute deviation, 32″.2 and 7 misses; corrected angle of sight, 2° 7′ 5″. (Appendix A, Table 1, No. 84.)

It having been determined that the bullet of the .45″ caliber cartridge should be hardened with one-thirteenth its weight of tin, in order to equalize the conditions between itself and the Martini-Henry bullet of the same caliber, the Board awaited the result of a series of targets with such bullet, the President stating that the ammunition was ready for trial.

FRANKFORD ARSENAL, *December* 14, 1872.

The President submitted to the Board the results of firing a series of five targets at 500 yards with .45″-caliber gun No. 16 and ammunition No. 58, the bullet hardened with one-thirteenth tin.

These targets were fired December 12, 1872, results as follows:

Mean absolute deviation, 8″.8; corrected angle of sight, 59′ 59″; wind

strong from left front, variable in direction and intensity. (Appendix A, Table 3, Nos. 83 to 87.)

This practice, the best on record of five targets without cleaning, was made in a strong and changeable wind, and left the gun very clean after 103 shots.

On the 13th of December the same gun, No. 16, and same ammunition, No. 58, were fired a target of twenty shots at 800 yards. The "Martini-Henry" being fired immediately after, the results communicated by the President were as follows:

.45″ caliber gun No. 16, cartridge No. 58: Mean absolute deviation, 23″.0; corrected angle of sight, 2° 27′ 16″. Wind light from rear. (Appendix A, Table 3, No. 107.)

.45″ caliber Martini-Henry gun and ammunition: Mean absolute deviation, 20″.5; corrected angle of sight, 2° 27′ 38″. Wind light from left rear. (Appendix A, Table 3, No. 106.)

FRANKFORD ARSENAL, *December* 19, 1872.

The President submitted to the Board the following results of firing at 1,050 yards with .45″ caliber gun No. 16 and ammunition No. 58, hardened bullet, in comparison with the Martini-Henry and Russian-Berdan, one target of twenty shots with each fired from shoulder and rest; wind—calm:

Guns and ammunition.	Mean deviation.	Angle of sight.	Misses.
.45″ caliber, hardened	35″ .2	3° 34′ 15″	0
Martini-Henry	33″ .7	3° 26′ 43″	4
Russian-Berdan	73″ .2	3° 36′ 32″	3

(Appendix A, Table 3, Nos. 115 and 116, and Table 2, No. 76.)

An additional series of five targets at 500 yards with the .45″ caliber gun No. 16 and hardened-bullet ammunition No. 58, had also been fired with the following results:

Fired December 17, from fixed rest—air calm: Mean absolute deviation, 10″.9; corrected angle of sight, 1° 4′ 26″. Gun quite clean after firing 105 shots. (Appendix A, Table 3, Nos. 88 to 92.)

FRANKFORD ARSENAL, *January* 6, 1873.

The President submitted to the Board the results of an additional series of five targets at 500 yards with the .45″ caliber gun No. 16 and hardened-bullet ammunition No. 58 as follows:

Fired December 24, from fixed rest. Wind generally from left rear, but very variable in force and direction.

Mean absolute deviation, 10″.2; corrected angle of sight, 1° 2′ 2″. Gun very clean after firing 100 shots. (Appendix A, Table 3, Nos. 93 to 97.)

Results of firing ten shots each, for penetration, at 500 yards, with .45″ caliber gun No. 16, and hardened-bullet ammunition No. 58, as compared with Martini-Henry, were also submitted as follows:

Penetration in white-pine boards at 500 yards, .45″ caliber, (ammunition No. 58,) 70 grains powder, 400-grain bullet	8″.8
Martini-Henry, 85 grains powder, 484-grain bullet.....	11″.2
Difference	2″.4

(Appendix A, Table 6, Nos. 5 and 6.)

The President also submitted results of firing five targets at 500 yards, with .40″ caliber gun No. 13, and hardened-bullet ammunition No. 59, as follows:

Fired January 2, 1873, from fixed rest; wind from left rear, light: Mean absolute deviation, 10″.2; corrected angle of sight, 59′ 59″. (Appendix A, Table 1, Nos. 72 to 76.)

Another series of five targets had been fired at 500 yards, with the same gun as last, with the charge increased from 65 grains to 70 grains, (ammunition No. 60,) with the following results:

Fired January 3 and 4, 1873, from a fixed rest; air—mostly calm: Mean absolute deviation, 12″.16; corrected angle of sight, 48′ 46″. Gun but little fouled or leaded by 100 rounds. (Appendix A, Table 1, Nos. 77 to 81.)

FRANKFORD ARSENAL,
Philadelphia, January 16, 1873.

The President submitted records of firing at all ranges from 100 to 1,050 yards, for trajectory, with the .45″ caliber barrel No. 16, using hardened-bullet ammunition No. 58, and the Martini-Henry No. 17, using its own ammunition No. 51.

These firings, havingfor their object only the determination of the angle of elevation necessary to attain each range with each gun, were fired from the shoulder and rest. Experience has shown that the fixed rest sets up certain vibrations in the gun which tend to obscure the results as regards elevation, the angle indicated being often much less than that required for shoulder-firing, and the disparity varying in amount and direction with differently-shaped guns.

The angles of sight obtained by these firings are recorded in Table 4, together with those of the .40″, .42″, .45″, and .50″ caliber trajectories already obtained, as reported in proceedings of November 29 and 30, and December 2, 1872.

Those trajectories for 1,050 yards are represented together on Figures 19 and 20, projected, in the one case, to exhibit their relative "flatness," irrespective of the angles of departure; in the other, to exhibit the paths when fired with equal elevations.

Figures 21 and 22 exhibit the first 500 yards of the same trajectories on a larger scale.

FRANKFORD ARSENAL,
Philadelphia, January 21, 1873.

The President submitted to the Board additional targets at 800 yards, made by the .45″ caliber rifle No. 16, using hardened-bullet ammunition No. 58, and with Martini-Henry rifle No. 17, using its own ammunition No. 51.

Three targets had been fired with each rifle, from shoulder and rest, with results as follows:

.45″ caliber, 800 yards, gun 16, cartridge No. 58: Mean deviation, 19″.5; 0 misses in 3 targets.

Martini-Henry: Mean deviation, 18″.6; 7 misses in 3 targets. Gun 16, cartridge No. 58, corrected angle, 2° 13′ 38″. Martini-Henry, corrected angle, 2° 25′ 38″. (Appendix A, Table 3, Targets No. 107 to 113.)

Three targets had also been fired at 800 yards with .40″ caliber ammunition No. 60, with hardened bullet using rifle 13; with indifferent accuracy, though with the usual low angle of that caliber.

Mean deviation, 27″.2; corrected angle, 1° 52′ 44″. Gun fouled and leaded by 65 shots. (Appendix A, Table 1, Targets 85, 86, and 87.)

The President stated that further firing at 1,050 yards was rendered impracticable by the ice at the firing-station, occasionally deflecting bullets upon the public road. He believed, however, that sufficient results were in possession of the Board to enable them to judge intelligently about the practice at that range.

FRANKFORD ARSENAL, *January* 25, 1873.

There were submitted to the Board the record of five additional targets of Martini-Henry, firing at 500 yards, the gun not being cleaned during the trial. The results were as follows:

Martini-Henry, 45″ caliber, at 500 yards, five targets of twenty shots without cleaning: Mean absolute deviation, 10″.2; corrected angle of sight, 1° 4′ 32″. Gun but slightly fouled by 102 shots. Wind—stiff breeze from left. (Appendix A, Table 3, Targets 98 to 102.)

FRANKFORD ARSENAL, *January* 31, 1873.

There were submitted to the Board, on this last day of its session, the records of six targets fired with the .45″ caliber gun No. 16, and hardened-bullet ammunition, substantially the same as No. 58, but the *bullet made by machinery*. The experimental bullets used in trials thus far being required in but small quantities of each form, have been usually turned up from compressed lead; the construction of a cherry and pair of dies for the fabrication, by machinery, of each of the slight experimental variations that have been made in the bullet would have been attended with great loss of time, to say nothing of cost.

When, however, a bullet so satisfactory in all respects as the one used in ammunition No. 58 had been arrived at, it appeared desirable, before its final indorsement by the Board, that the practicability of producing it by machinery, without deterioration in any of its shooting qualities, should be demonstrated.

Such bullets were accordingly ordered, and the results of firing them for six targets of 20 shots each is here inserted; these results having arrived too late to be included in regular sequence in the tables of .45″ caliber, firing in Appendix A:

1st	target,	mean	absolute	deviation	8″.18
2d	"	"	"	"	10″.80
3d	"	"	"	"	6″.27
4th	"	"	"	"	7″.91
5th	"	"	"	"	9″.34
6th	"	"	"	"	8″.97
Average					8″.58
Corrected angle average					1° 4′ 35″

This is the best average for an equal number of consecutive targets on record either at Springfield or Frankford, and the third is the best single target at 500 yards on record.

These results are not embodied in the summary which had been made up for this day's proceedings of the Board, and which appears further on. If so embodied they would make the total practice of this gun and ammunition, at 500 yards, give, in all weathers, the mean absolute deviation of 9″.57.

FRANKFORD ARSENAL,
Philadelphia, January 31, 1873.

The Board met pursuant to call of the President. Present, Major T. J. Treadwell and Lieutenant William Prince.

A communication from the President of the Board having directed that the members present consider the results obtained in the trials instituted by the Board, and express their opinions founded thereon, it was first—

Resolved, That "the determination of a proper caliber for small-arms," as stated in the order convening the Board, necessarily involves the determination of the system of rifling and chambering, as well as all the essential features of the ammunition.

The Board then carefully reviewed the proceedings and reports of experiments under the various points involved, as recorded in these minutes and in Appendices A and B.

The number of forms experimented with under each of the points considered were found to be briefly as follows:

Calibers.

Four calibers were tested in various forms as follows:

.40″ *caliber.*—Seven forms of barrel and twenty-seven forms of ammunition.

.42″ *caliber.*—Eleven forms of barrel and twenty-six forms of ammunition.

.45″ *caliber.*—Nine forms of barrel and twenty-five forms of ammunition.

.50″ *caliber.*—One form of barrel (service) and one form of ammunition, (service.)

Rifling.

Seven styles of grooves have been tested, with *ten* different twists, in various calibers, as follows:

3 *grooves*, plain, with seven different twists, in four calibers.

4 *grooves*, plain, with two different twists, in two calibers.

5 *grooves*, plain, with two different twists, in two calibers.

6 *grooves*, plain, with two different twists, in two calibers.

7 *grooves*, tangential, with two different twists, in two calibers.

7 *grooves*, "ratchet," with two different twists, in two calibers.

Variations have also been made in the width and depth of grooves, all which appear fully in the descriptions in Appendices A and B.

Chambering.

Various lengths and degrees of contraction in "bottle-shaped" chambers have been compared with each other and with straight chambers of different lengths, the "throats" of the chambers having also been variously modified at their junction with the rifled-bore.

Charge of powder.

Charges of 60, 65, 70, 75, 80, and 85 grains have been tried in various calibers and combinations, as follows, all fully described in Appendices A and B.:

60 *grains*, in three calibers, five forms of barrel, six forms of cartridge.

65 *grains*, in three calibers, eleven forms of barrel, nineteen forms of cartridge.

70 *grains*, in four calibers, eleven forms of barrel, twenty forms of cartridge.

75 *grains*, in three calibers, twelve forms of barrel, sixteen forms of cartridge.

80 *grains*, in three calibers, twelve forms of barrel, thirteen forms of cartridge.

85 *grains*, in one caliber, one form of barrel, one form of cartridge.

Weight of bullet.

Bullets of various weights, from 290 to 484 grains, have been tested with various charges, calibers, chambers, twists, &c., as appears in the descriptions of ammunition in Appendices A and B.

Form of bullet.

Bullets of various forms, *cannelured* and plain, ellipsoidal, conoidal, and flat-fronted, have been tried with the several calibers and combinations, as described in Appendices A and B.

Material of bullet.

The experiments in this direction have been limited to lead and an alloy of lead with one-thirteenth its weight in tin.

Lubrication.

Various materials, tallow, bees-wax, Japan wax, bayberry wax, and graphite, applied in the *cannelures* as a disk at the base, in saturated paper, and as a coating in front, have been tried, with and without patches, as will be seen by descriptions in Appendices A and B.

Cases and priming.

These have only been considered so far as they affected the chambering of the gun and the lap on the bullet. Various degrees of contraction or "bottle-shape" have been compared with each other and with straight cases of different lengths. The merits of short and long lap have also been considered. Other details have been left to be determined by the practical considerations incidental to the manufacture of the case.

The various forms of bore and ammunition have been tested for accuracy, flatness of trajectory, cleanliness, (as evinced by sustained good practice,) penetration, pressures, velocities, and recoils. Regard has also been had to weight of barrel and cartridge, and to the form and strength of the latter.

In the course of the investigations upward of five hundred targets, of twenty shots each, have been fired at different ranges and under various conditions.

In order to narrow down the field of comparison and selection, it was determined that, in the prime condition of

Accuracy,

no system should be considered which could not show a mean absolute deviation of less than one foot at 500 yards from a series of five targets, of twenty shots each, fired without cleaning the gun.

On a review of the firing records of the experimental barrels and

cartridges, this condition is found to be complied with in the following cases:

Mean absolute deviation at 500 yards. Five targets of twenty shots each without cleaning. Fired from fixed rest.

.40″ caliber.

Gun No. 3, ammunition No. 17, mean deviation	10″.4
Gun No. 13, ammunition No. 46, mean deviation	10″.4
Gun No. 13, ammunition No. 59, mean deviation	10″.2

.42″ caliber.

Gun No. 4, ammunition No. 38, mean deviation	10″.0

.45″ caliber.

Gun No. 2, ammunition No. 25, mean deviation	10″.5
Gun No. 11, ammunition No. 47, mean deviation	11″.1
Gun No. 16, ammunition No. 50, mean deviation	10″.5
Gun No. 16, ammunition No. 58, mean deviation	8″.8
Gun No. 16, ammunition No. 58, mean deviation	10″.9
Gun No. 16, ammunition No. 58, mean deviation	10″.2

Additional series of targets have been fired with all these guns and cartridges substantially the same, but only in the case of gun No. 16, with cartridge No. 58, has the good practice been sustained under all circumstances of wind and weather.

On the occasion (December 12) of its making the mean absolute deviation of 8″.8 from five targets without cleaning, (the best performance known to our records,) the wind, &c., is reported "strong from front and left, varied a good deal in intensity and direction; temperature 10° above zero, Fahr. Gun very clean after firing 103 shots." (Appendix A, Table 3, Targets 83 to 87.)

On the occasion (December 17) of making the mean absolute deviation of 10″.9 the following remarks are recorded: "Wind calm. Gun quite clean after firing 105 shots." (Appendix A, Table 3, Targets 88 to 92.)

On the occasion (December 24) of making the mean absolute deviation of 10″.2 it is remarked: "Wind very variable in force and direction; general direction from left. In the last two targets a little steadier than in others, from left and rear. Gun very clean after firing." The last three of these five targets average 9″ mean absolute deviation. (Appendix A, Table 3, Targets 93 to 97.)

Accuracy at 800 yards—fired from shoulder and rest.

At this range the .40″ calibers show an average—

Mean absolute deviation of	27″.2 with 3 misses	to 2 targets.
The .42″ calibers	23″.5 with 3 misses	to 1 target.
The .45″ calibers	22″.1 with 1 miss	to 2 targets.
Gun No. 16, with cartridge No. 58	20″.4 with 1 miss	to 2 targets.

Accuracy at 1,050 yards—fired from shoulder and rest.

At this range the .40″ calibers show an average—

Mean absolute deviation of	49″.0
The .42″ calibers	46″.0
The .45″ calibers	46″.1
Gun No. 16, with cartridge No. 58	35″.2

The fact that these long-range firings were not executed from the fixed rest is to be considered in comparing them with other records.

Of the foreign arms fired for comparison, the Martini-Henry (English) was the only one whose sustained practice at 500 yards gave any pretensions to further trials at longer ranges. Its accuracy at the various ranges is as follows:

For 500 yards, mean deviation	9″.9.
For 800 yards, mean deviation	20″.1, with 2 misses to a target.
For 1,050 yards, mean deviation	33″.7, with 5 misses to a target.

The next best foreign arm, the Russian-Berdan, stands as follows:

For 500 yards, mean deviation	14″.9.
For 800 yards, mean deviation	26″.7, with 7 misses.
For 1,050 yards, mean deviation	73″.2, with 3 misses.

Flatness of trajectory.

In the matter of flatness of trajectory it is usual to judge by comparing the angles of sight of different guns at the same range. This method is, however, liable to mislead, from the fact that it is not the smallness of the angle at a given range that indicates a flat trajectory, but the smallness of the difference between that angle and the angles used for shorter ranges.

The actual trajectories, as exhibited in Figures 19 to 22, give a much clearer and more trustworthy record of the comparative merits of the guns, in the matter of flatness of trajectory, than any tables of angles could do.

The data required for their construction were obtained by firing from the shoulder and muzzle-rest, in order to eliminate any restraining effect of the fixed rest in modifying the angle of departure.

An inspection of Figure 19, which exhibits five different trajectories for 1,050 yards, the flatest is that of the .40″ caliber, whose performance in other respects, however, has been shown to be indifferent at long ranges.

Then come two intersecting trajectories, the Martini-Henry and the .45″ caliber gun No. 16, with ammunition No. 58. The former is the lower for 750 yards, the latter is lower at the close, a less angle of arrival, which determines the "dangerous space."

The .42″ caliber comes next, and then the trajectory of the present

½-inch caliber. The angles of departure are indicated by the red-ink lines radiating upwards from the beginning of the trajectories, all angles being multiplied by ten to correspond with the vertical scale of the projections.

The angles of departure are rendered more conspicuous in Figure 20, which gives the path which would be pursued by each bullet if the guns were fired with equal elevation.

Figures 21 and 22 afford similar means of judging of the features of the 500-yard trajectory.

Cleanliness.

The comparative cleanliness of various systems is deemed to be sufficiently indicated by the degree to which their performance is sustained up to the last of the hundred shots, and the condition of the gun at the close, as given in the column of remarks in the tables of firing.

A clean gun at the close, with no material falling off in accuracy for 100 rounds, is a condition attained by several systems in each of the calibers and by some repeatedly.

In .40″ caliber (table 1) it is attained by—

Gun No. 3, ammunition No. 19, target No. 32, et seq.
Gun No. 12, ammunition No, 44, target No. 39, et seq.
Gun No. 13, ammunition No. 46, target No. 53, et seq.
Gun No. 13, ammunition No. 46, target No. 67, et seq.
Gun No. 13, ammunition No. 59, target No. 72, et seq.
Gun No. 13, ammunition No. 60, target No. 77, et seq.

In .42″ calibers (table 2) it is attained by—

Gun No. 4, ammunition No. 38, target No. 17, et seq.
Gun No. 10, ammunition No. 38, target No. 22, et seq.
Gun No. 10, ammunition No. 48, target No. 27, et seq.
Gun No. 15, ammunition No. 49, target No. 36, et seq.
Gun No. 20, ammunition No. 54, target No. 59, et seq.

In .45″ calibers (table 3) it is attained by—

Gun No. 2, ammunition No. 25, target No. 2, et seq.
Gun No. 5, ammunition No. 29, target No 28, et seq.
Gun No. 8, ammunition No. 39, target No. 50, et seq.
Gun No. 11, ammunition No. 47, target No. 58, et seq.
Gun No. 16, ammunition No. 50, target No. 63, et seq.
Gun No. 16, ammunition No. 50, target No. 78, et seq.
Gun No. 16, ammunition No. 58, target No. 83, et seq.
Gun No. 16, ammunition No. 58, target No. 88, et seq.
Gun No. 16, ammunition No. 58, target No. 93, et seq.

In all these cartridges the lubricant was applied in the *cannelures*, and the contrast with the practice obtained with patches, base-disks, greased patches, &c., is extremely marked. The lubricant employed in the best of the above practice was the compound originally used in the

Springfield ammunition, and consists of eight parts of bayberry wax to one part of graphite.

This lubricant has of late years been replaced by Japan wax on account of the uncertainty of the supply of bayberry wax, but its superiority has always been acknowledged.

The only foreign system that shows no deterioration of practice in 100 rounds is the English "Martini-Henry." (Appendix A, Table 3, Targets 68 to 77.)

The Swiss "Vetterlin" comes out clean from the trial, but the ammunition is "dipped," a style of lubrication that generally secures cleanliness, but is itself objectionable on many accounts. (Appendix A, Table 2, Targets 41, et seq.)

The Dutch "Beaumont" comes out "badly fouled and leaded by 100 shots." (Appendix A, Table 3, Targets 40, et seq.)

The "Russian-Berdan," though the ammunition is "dipped" in addition to the base-lubrication, is reported "foul and leaded by 100 rounds." (Appendix A, Table 2, Targets 64, et seq.)

The Austrian "Werndl" goes completely wild after 60 shots. (Appendix A, Table 2, Targets 46, et seq.)

Penetration.

Trials for short-range penetrations have been dispensed with, a good penetration at 500 yards being assumed to include the lesser ranges.

By Table 6, Appendix A, the average penetrations in pine boards at 500 yards appear to stand as follows:

.50″ caliber, service, 70 grains powder, 450 grains lead	7″.2
.40″ caliber, 65 grains powder, 350 grains lead	8″.1
.42″ caliber, 65 grains powder, 365 grains lead	8″.6
.45″ caliber, 70 grains powder, 400 grains lead	6″.8
.45″ caliber, 70 grains powder, 405 grains lead, hardened	8″.8
Martini-Henry, 85 grains powder, 484 grains lead, hardened	11″.2

From which it appears that the .45″ caliber (gun No. 16, ammunition No. 58) gives the greatest penetration of any experimental system tried; the additional 2″.4 of the Martini-Henry being gained by 15 grains more powder and 80 grains more lead.

Recoils.

The absolute practical recoil of an arm is difficult of determination. Reliable comparative recoils are, however, obtained by allowing the butt to rest against a coiled spring with a proper index. The following relative recoils were so obtained:

.50″ caliber, service	129.6 pounds.
.45″ caliber, hardened bullet, gun 16, ammuniton 58	123.6 pounds.
Martini-Henry	139.3 pounds.

The Board was inclined to attach considerable importance to dimin-

ished recoil, deeming that refinements of action in other directions are largely thrown away if there is to be any flinching in the soldier who pulls the trigger.

In its view the additional 2″.4 inches of penetration at 500 yards of the Martini-Henry is too dearly bought at 16 pounds increased recoil, leaving out of consideration the much heavier ammunition.

Pressures and velocities.

Experiments in this direction were directed to determining whether the straight or bottle-shaped chambers and cases sustained the greater pressure in communicating equal velocities.

It will be observed (Table 5, Appendix A) that, for every hundred feet of velocity impressed, the following number of pounds pressure per square inch was sustained, the charges being equal:

Bottle-shaped chamber.		Straight chamber.	
.45″ caliber	1402 lbs.	.45″ caliber	1254 lbs.
.42″ caliber	1327 lbs.	.42″ caliber	1238 lbs.
		.40″ caliber	1434 lbs.

Weight of barrel.

The barrels for reduced calibers were first made to preserve the exterior dimensions of the present Springfield barrel, which of course gave increased weight. They were subsequently reduced, as appears in Descriptions of Arms.

The following figures indicate the increased weight of barrel incident to reduced bores. The weights are exclusive of breech-mechanism:

	Pounds.	Ounces.
No. 1, Springfield barrel, .50″ caliber	4	.....
No. 8, Springfield barrel, .45″ caliber	4	1
No. 4, Springfield barrel, .42″ caliber	4	4
No. 3, Springfield barrel, .41″ caliber	4	5

The metal of these barrels, when reduced to the same thickness as that of the Springfield barrel at the muzzle, while retaining the exterior dimensions of the Springfield barrel near the breech, give the following weights:

	Pounds.	Ounces.
45″ caliber, lightened, Nos. 11 and 16	3	9
42″ caliber, lightened, Nos. 10, 15, and 20	3	7
40″ caliber, lightened, Nos. 9, 13, and 14	3	5½

In order to compare the weights of entire guns with those of foreign arms, the following weights of the lightened barrels, mounted as Springfield rifles, are recorded. The weights are exclusive of bayonets:

	Pounds.	Ounces.
Springfield rifle, caliber .50″	9	3
Nos. 11 and 16, caliber .45″	9	1½
Nos. 10, 15, and 20, caliber .42″	8	15½
Nos. 9, 13, and 14, caliber .40″	8	14
English "Martini-Henry"	8	12
Russian "Berdan"	9	2
Swiss "Vetterlin"	10	----
Dutch "Beaumont"	9	11
Austrian "Werndl"	9	11

Weight of ammunition.

The necessity for a soldier's carrying the largest possible number of cartridges, which is rendered imperative by the greatly-increased capacity of breech-loading arms, indicates the propriety of keeping down the weight of the cartridge to the minimum consistent with effective practice, and has been kept in view by the Board.

The following is a statement of the weight of 40 rounds of each of the cartridges mentioned:

	Pounds.	Ounces.
Springfield, .50″ caliber	3	13
No. 58, .45″ caliber	3	7
Nos. 49, &c., .42″ caliber	3	5
Nos. 59, &c., .40″ caliber	3	2
English "Martini-Henry"	4	6
Russian "Berdan"	3	7
Austrian "Werndl"	2	14
Swiss "Vetterlin"	2	10
Dutch "Beaumont"	4	2

From which it appears that 51 rounds of ammunition No. 58 could be carried at less weight than 40 rounds of the only foreign ammunition whose performance assimilates with it, viz, the Martini-Henry.

Opinion.

In view of the results thus summarized, the Board is of opinion that, of the various experimental systems tried—

Barrel No. 16, (.45″ *caliber,*) *with ammunition No.* 58, combines in the greatest degree the following qualities:

1. Accuracy in all winds.
2. Cleanliness, or sustained accuracy.
3. Flatness of trajectory.
4. Penetration at long ranges.

5. Moderate recoil.
6. Lightness of arm.
7. Lightness of ammunition.

This barrel and ammunition may be described as follows: (See also Figure 18 of Appendix A.)

Barrel No. 16.

Caliber.—Forty-five one-hundredths of an inch, (.45″.)

Length.—From the bottom of the bore to the muzzle, including chamber, thirty-two and one-half inches, (32″.5.)

Weight.—Three pounds and nine ounces, avoirdupois, (3 pounds 9 ounces, avoirdupois.)

Rifling.—Three plain concentric grooves, equal in width to the lands, five one-thousandths of an inch (.005″) deep, with an uniform twist of one turn in twenty-two inches, (22″.)

Chamber.—To consume two inches and one hundred and sixty-five one-thousandths of an inch (2″.165) of the length of the bore, divided as follows:

1st. A flange-seat, cylindrical, six hundred and forty-five one-thousandths of an inch (.645″) in diameter, and sixty-five one-thousandths of an inch (.065″) long.

2d. A conical frustum, two inches and thirty-five one-thousandths of an inch (2″.035) long, five hundred and eight one-thousandths of an inch (.508″) in diameter at its larger base next the flange-seat, and four hundred and eighty-two one-thousandths of inch (.482″) in diameter at its smaller base in front.

3d. A conical frustum, sixty-five one-thousandths of an inch (.065″) long, four hundred and eighty-two one-thousandths of an inch (.482″) in diameter at its larger base, next the last described frustum, and forty-five one-hundredths of an inch (.45″) in diameter at its smaller base, where it meets the bore in front.

Ammunition No. 58.

Powder.—Seventy grains (70 grs.) "musket"-sized grain.

Bullet.—Twelve parts by weight of lead and one part by weight of tin, compressed. The form (disregarding for the moment the *cannelures*) is a cylinder, surmounted by a conical frustum, which is surmounted by a spherical segment. Length of cylinder, fifty-five one-hundredths of an inch, (.55″;) diameter of cylinder, four hundred and fifty-eight one-thousandths of an inch, (.458″.) Length of frustum, thirty-five one-hundredths of an inch (.35″;) diameter of larger base next to cylinder, four hundred and fifty-eight one-thousandths of an inch, (.458″;) diameter of smaller base, forty-two one-hundredths of an inch, (.42″;) spherical segment tangential to the cone, nearly a hemisphere, making the total length of the bullet one inch and eleven one-hundredths of an inch, (1″.11.)

Five rectangular *cannelures*, seventy-five one-thousandths of an inch (.075″) wide, three one-hundredths (.03″) of an inch deep, separated from the base, and from each other by spaces of five one-hundredths of an inch, (.05″.) A dished cavity in the base, sufficient to bring the bullet to a weight of four hundred and five grains, (405 grs.)

Case, metallic, simple-flanged frustum, of the following exterior dimensions:

Diameter of flange sixty-one one-hundredths of an inch, (.61″;) thickness, sixty-five one-thousandths of an inch, (.065″;) diameter of frustum, next to flange, five hundred and five one-thousandths of an inch, (.505″;) diameter in front, forty-eight one-hundredths of an inch, (.48″;) length of frustum, two inches and thirty-five one-thousandths of an inch, (2″.035.) Embracing the bullet for six hundred and twenty-five one-thousandths of an inch (.625″) of its length, and snugly choked around it without indenting.

Lubricant.—Eight parts of bayberry-wax and one part of graphite, applied in the *cannelures.*

The Board is of opinion that the material, method of manufacture, thickness and priming of the cartridge-cases, should be largely determined by practical considerations incident to their manufacture, and believe that, if the exigencies of fabrication require a less taper to the case and chamber than the one described, the larger diameter of both may be reduced by one one-hundredth of an inch (.01″) without affecting the efficiency of arm or ammunition.

In regard to "drift" or "derivation" toward the side of the twist, the Board is of opinion that, as it is a source of error inseparable from the use of a rifle with elongated projectile, it should be provided for by a curvature of the rear-sight leaf, the proper amount to be determined by extended firing of whatever system may be adopted. The trajectory of barrel No. 16, with ammunition No. 58, is represented in detail with "dangerous spaces," on Figure 23 accompanying this report.

Respectfully submitted to the Chief of Ordnance.

J. G. BENTON,
Major of Ordnance and President of Board.
T. J. TREADWELL,
Major of Ordnance.
WM. PRINCE,
First Lieutenant Ordnance, U. S. Army.

Approved:

A. B. DYER,
Chief of Ordnance.

NOTE.—Captain J. R. Edie, of the Ordnance Department, had the immediate supervision of the firings made at the Springfield Armory.

APPENDIX A.

DESCRIPTIONS OF GUNS.

Appendix to proceedings of the Board on calibers for small-arms; convened by Special Order No. 107, *Adjutant General's Office, May* 7, 1872.

DESCRIPTION OF GUNS USED IN EXPERIMENTS.

No. 1.—The Springfield breech-loading rifle-musket, model 1870, caliber .50″. Three plain grooves equal in width to lands; depth, .01″ at breech, .005″ at muzzle; twist, uniform, one turn in 42″. Several of these guns were used during the trials. Weight of gun, 9 pounds 3 ounces; weight of barrel, 4 pounds.

See Fig. 1 for form of chamber, &c.

No. 2.—.45″ caliber barrel. Three plain grooves, equal in width to lands; depth, .01″ at breech, .005″ at muzzle; twist, uniform, one turn in 23″. Chambered for bottle-shaped cases, to hold 75 or 80 grains of powder.

See Fig. 2 for form of chamber, &c. (Gun No. 51, Frankford Arsenal record.)

No. 3.—.40″ caliber barrel. Three plain grooves, equal in width to lands; depth, .01″ at breech, .005″ at muzzle; twist, uniform, one turn in 18″. Chambered for straight cases; frustum, 2″.45 long; diameters, .45″ and .43″. Two of these guns were used during the trials. Weight of barrel, 4 pounds 5 ounces.

See Fig. 4 for form of chamber, &c. (Gun No. 78, Frankford Arsenal record.)

No. 4.—.42″ caliber barrel. Three plain grooves, equal in width to lands; depth, .01″ at breech, .005″ at muzzle; twist, uniform, one turn in 18″. Chambered for straight cases; frustum, 2.″45 long; diameters, .48″ and .45″. Weight of barrel, 4 pounds 4 ounces.

See Fig. 5 for form of chamber, &c. (Gun No. 79, Frankford Arsenal record.)

No. 5.—.45″ caliber barrel. Three plain grooves, equal in width to lands; depth, .01″ at breech, .005″ at muzzle; twist, uniform, one turn in 18″. Chambered for bottle-shaped, short-lap cases, with necks .3″ shorter than those used in gun No. 2.

See Fig. 9 for form of chamber, &c. (Gun No. 77, F. A. R.)

No. 6.—Dutch rifle-musket, .44″ caliber (.455″ bullet.) Four plain grooves, equal in width to lands; depth, .01″; twist, uniform, 30″. Chambered for bottle-shaped cases. Weight of gun, 9 pounds 11 ounces.

See Fig. 10 for form of chamber, &c. (Gun No. 81, F. A. R.)

No. 7.—Russian-Berdan rifle-musket, .42″ caliber. Six plain grooves, twice the width of the lands; depth, .01″; twist, uniform, 20″. Chambered for bottle-shaped cases. Weight of gun, 9 pounds 2 ounces.

See Fig. 11 for form of chamber, &c. (Gun No. 71, F. A. R.)

No. 8.—.45″ caliber. Three plain grooves, equal in width to lands; depth, .01″ at breech, .005″ at muzzle; twist, uniform, 18″. Chambered for straight cases, frustum 2″.24 long, diameters .511″ and, .48″. Weight of barrel, 4 pounds 1 ounce.

See Fig. 12 for form of chamber, &c. (Gun No. 83, F. A. R.)

No. 9.—.40″ caliber. Like No. 3, but barrel lightened by reducing the exterior diameter until the walls were no thicker than in the service-rifle, caliber .50″ at the muzzle, though retaining the full service external dimensions at the breech. Weight of barrel, 3 pounds 5½ ounces. Weight of gun, 8 pounds 14 ounces. (Gun No. 84, F. A. R.) Figure 4, chamber.

No. 10.—.42″ caliber. Like No. 4, but barrel lightened by reducing the exterior diameter until the walls were no thicker than in the service-rifle, caliber .50″ at the muzzle, though retaining the full service external dimensions at the breech. Twist changed from 18″ to 20″. Weight of barrel, 3 pounds 7 ounces. Weight of gun, 8 pounds 14½ ounces. (Gun No. 85, F. A. R.) Figure 5, chamber.

No. 11.—.45″ caliber. Like No. 8, but barrel lightened by reducing the exterior diameter until the walls were no thicker than in the service-rifle, caliber 50″ at the muzzle, though retaining the full service external dimensions at the breech. Twist changed from 18″ to 22″. Weight of barrel, 3 pounds 9 ounces. Weight of gun, 8 pounds 14 ounces. (Gun No. 86, F. A. R.) Figure 12, chamber.

No. 12.—.40″ caliber. Henry barrel, seven tangential (Henry) grooves, .164″ wide; lands, .01″ wide; twist, uniform, 18″. Chambered for straight cases, frustum 2″.5 long, diameters .45″ and .43″. (Gun No. 87, F. A. R.) Figure 4, chamber.

No. 13.—.40″ caliber, short throat, light barrel. Like No. 3, but barrel lightened and throat of chamber shortened to .06″ to accommodate cartridges in which the bullet was pressed into the case until all the *cannelures* were covered. Weight of barrel, 3 pounds 5½ ounces. Weight of gun, 8 pounds 14 ounces.

See Fig. 14 for form of chamber, &c. (Gun No. 88, F. A. R.)

No. 14.—.40″ caliber, medium throat, light barrel. Like No. 3, but barrel lightened and throat of chamber shortened to .2″ to accommodate cartridges in which the bullet was pressed into the case until all but one of the *cannelures* were covered. Weight of barrel, 3 pounds 5½ ounces. Weight of gun, 8 pounds 14 ounces.

See Fig. 13 for form of chamber, &c. (Gun No. 89, F. A. R.)

No. 15.—.42″ caliber, short throat, light barrel. Like No. 4, but barrel lightened and throat of chamber shortened to accommodate cartridges where all the *cannelures* of the bullet are covered by the case. Twist 20″. Chamber also shortened .13″ to accommodate the shortened case of am-

munition No. 49. Weight of barrel, 3 pounds 7 ounces. Weight of gun, 8 pounds 15½ ounces.

See Fig. 15 for form of chamber, &c. (Gun No. 90, F. A. R.)

No. 16.—.45″ caliber, short throat, light barrel Like No. 8, but with grooves of a uniform depth of .005″, and the barrel lightened and throat of chamber shortened to accommodate cartridges where all the *cannelures* are covered by the case. Twist 22″. Chamber also shortened .18″ to accommodate ammunition No. 50. Weight of barrel, 3 pounds 9 ounces. Weight of gun, 9 pounds 1½ ounces.

See Fig. 16 for form of chamber, &c. (Gun No. 91, F. A. R.)

No. 17.—Martini-Henry, English, caliber .45″; uniform twist, 22″; seven grooves, tangential. Weight of gun, 8 pounds 12 ounces.

See Fig. 18 for form of chamber, &c. (Gun No. 92, F. A. R.)

No. 18.—Vetterlin, Swiss, caliber .411″, (classed with .42″ caliber.) Magazine-arm. Uniform twist, 26″.5; 4 grooves, equal to width of lands. Weight of gun 10 pounds. (Gun No. 93, F. A. R.)

No. 19.—Werndl, Austrian, caliber .425″. Uniform twist, 28″; 6 grooves, twice width of lands. Weight of gun 9 pounds 11 ounces. (Gun No. 94, F. A. R.)

No. 20.—.42″ caliber. Like No. 15, but with a twist of 24″. Figure 15, chamber. (Gun No. 95, F. A. R.)

No. 21.—.42″ caliber. Short bottle-shaped chamber. Twist, 30″. Three plain grooves, equal in width to lands, used for comparing *pressures* of bottle-shaped chamber with straight chamber. (Gun No. 47, F. A. R.)

DESCRIPTION OF AMMUNITION TESTED.

Fig. 1—No. 1—"Service" cal. .50″ Centre-fire metallic cartridge. Powder, 70 grains "musket;" bullet, 450 grains lead, cylindro-conoidal; length, 1″; diameter of cylindrical portion, .515″; length of cylindrical portion, .54″; diameter of front, .1″; 3 rectangular *cannelures*, .07″ wide and .02″ deep, beginning .1″ from base; inter-*cannelures* .06″ wide; case, copper, 1″.75 long; diameters .562″ to .54″; diameter of flange, .665″; priming, Frankford Arsenal cup or "Martin pocket;" lubrication, Japan wax in *cannelures*. Total length of cartridge, 2″.25. Total weight, 665 to 670 grains.

Fig. 4 (*a*)—No. 2—.40″ caliber. Straight case. Powder, 80 grains "musket;" bullet, 350 grains, lead, smooth, blunt, cylindro-ellipsoidal; diameter, .4″; length, 1″.12; length of cylindrical portion, .56″; case, copper, 2″.5 long; diameters .44″ to .43″; diameter of flange, .515″; priming, "Martin pocket;" lubrication, a greased patch of two wraps of bank-note paper saturated with bayberry wax. Total length of cartridge, 3″.28. Total weight, 558 grains. (F. A., No. 221.)

Fig. 4 (*a*)—No. 3—.40″ caliber. Like No. 2, but with charge of 57 grains; same length, powder less compressed. (F. A., No. 222.)

Fig. 4 (*a*)—No. 4—.40″ caliber. Like No. 2, but with charge of 70 grains; same length, powder less compressed. (F. A., No. 223.)

Fig. 4 (*a*)—No. 5—.40″ caliber. Like No. 2, but with charge of 65 grains; same length, powder less compressed. (F. A., No. 224.)

Fig. 4 (*a*)—No. 6—.40″ caliber. Like No. 2, but bullet end dipped in bayberry wax after completion. (F. A., No. 225.)

Fig. 4 (*a*)—No. 7—.40″ caliber. Like No. 2, but with 75-grain charge, and bullet end dipped in bayberry wax after completion. (F. A., No. 226.)

Fig. 4 (*a*)—No. 8—.40″ caliber. Like No. 2, but with 70-grain charge and bullet end dipped in bayberry wax after completion. (F. A., No. 227.)

Fig. 4 (*a*)—No. 9—.40″ caliber. Like No. 2, but with 65-grain charge, and bullet end dipped in bayberry wax after completion. (F. A., No. 228.)

Fig. 4 (*b*)—No. 10—.40″ caliber. Like No. 2, except bullet, which weighs 400 grains, is 1″.3 long, with 7 rectangular *cannelures*, blunt cylindro-ellipsoidal; diameter, .405″; length of cylindrical portion, .75″, lubricated in the *cannelures*. Total length of cartridge, 3″.45. Total weight, 613 grains. (F. A., No. 229.)

Fig. 4 (*c*)—No. 11—.40″ caliber. Like No. 2, but with 75-grain charge, and bullet with 4 *cannelures*, lubricated in *cannelures* only; no patch. (F. A., No. 230.)

Fig. 4 (*c*)—No. 12—.40″ caliber. Like No. 2, but with 70-grain charge, and bullet with 4 *cannelures*, lubricated in *cannelures* only; no patch. (F. A., No. 231.)

Fig. 4 (*c*)—No. 13—.40″ caliber. Like No. 2, but with 65-grain charge, and bullet with 4 *cannelures*, lubricated in *cannelures* only; no patch. (F. A., No. 232.)

Fig. 4 (*c*)—No. 14—.40″ caliber. Like No. 2, but with 70-grain charge, and bullet with 5 *cannelures* .01″ deep, lubricated in *cannelures* and dipped; no patch. (F. A., No. 233.)

Fig. 4 (*c*)—No. 15—.40″ caliber. Like No. 2, but with 65-grain charge, and bullet with 5 *cannelures* .01″ deep, lubricated in *cannelures* and dipped; no patch. (F. A., No. 234.)

Fig. 4 (*c*)—No. 16—.40″ caliber. Like No. 2, but with 70-grain charge, and bullet with 5 *cannelures* .01″ deep, lubricated in the *cannelures* only. (F. A., No. 235.)

Fig. 4 (*c*)—No. 17—.40″ caliber. Like No. 2, but with 65-grain charge, and bullet with 5 *cannelures* .01″ deep, lubricated in the *cannelures* only. (F. A., No. 236.)

Fig. 4 (*c*)—No. 18—.40″ caliber. Like No. 2, but with 60-grain charge, and bullet with 5 *cannelures* .01″ deep; lubricated in the *cannelures* only. (F. A., No. 237.)

Fig. 4 (*c*)—No. 19—.40″ caliber. Like No. 2, but with 65-grain charge, and bullet with 5 *cannelures* .02″ deep; weight, 340 grains; lubricated in the *cannelures* only. (F. A., No. 238.)

Fig. 5—No. 20—.42″ caliber. Straight case. Powder, 70 grain mus-

ket; bullet 370 grains lead, blunt cylindro-ellipsoidal, with 4 rectangular *cannelures* .01″ deep; diameter, .425″; length, 1″.08; length of cylindrical portion, .54″; case, copper, 2″.45 long; diameters, .48″ to .45″; diameter of flange .55″; priming, "Martin pocket;" lubrication in *cannelures* only. Total length of cartridge, 3″.1. Total weight, 580 grains. (F. A., No. 239.)

Fig. 5—No. 21—.42″ caliber. Like No. 20, but with 75-grain charge; same length; powder more compressed. (F. A., No. 240.)

Fig. 5—No. 22—.42″ caliber. Like No. 20, but with 80-grain charge; same length; powder more compressed. (F. A., No. 241.)

Fig. 5—No. 23—.42″ caliber. Like No. 20, but with *cannelures* of bullet .02″ deep; weight, 365 grains. (F. A., No. 242.)

Fig. 4 (*d*)—No. 24—.40″ caliber. Like No. 2, but with 70-grain charge, and 290-grain bullet; length of bullet, .96″. Total length of cartridge, 3″.1. (F. A., No. 243.)

Fig. 2 (*a*)—No. 25—.45″ caliber. Bottle-shaped, *cannelured*. Powder, 75 grains musket; bullet, cylindro-conoidal, 3 *cannelures* .1″ at surface, .09″ wide at bottom, .025″ deep; beginning .17″ from base of bullet, inter-*cannelures* .07″ wide; weight, 440 grains; length, 1″.1; length of cylindrical portion, .75″; diameter, .46″; diameter of flat front, .15″; case, copper, bottle-shaped, 2″ long; base same as service-case, (No. 1;) contraction to .46″ internal diameter at 1″.4 from base; priming, Frankford Arsenal cup; lubrication, Japan wax in *cannelures* and dipped. Total length of cartridge, 2″.5. Total weight, 679 grains. (F. A., No. 155.)

Fig. 6—No. 26—.45″ caliber. Bottle-shaped, *cannelured*; short-lap same as No. 25, but throat of case shortened .2″ and bullet inserted but .2″; wad of lubricant behind bullet .2″ to fill up the case; case knurled into bullet. (F. A., No. 217.)

Fig. 3 (*a*)—No. 27—.45″ caliber. Bottle-shaped, smooth patched. Powder, 75 grains musket; bullet, cylindro-ellipsoidal; weight, 425 grains; length, 1″.09; length of cylindrical portion, .64″; diameter, .45″, patched with two wraps of bank-note paper for .5″ of its length; lubrication, a disk of Japan wax behind the bullet; case, copper, bottle-shaped, 2″ long, base same as service-case, (No. 1,) contraction to .46″ internal diameter at 1″.4 from base; priming, Frankfort Arsenal cup. Total length of cartridge, 2″.6. Total weight, 670 grains. (F. A., No. 205.)

Fig. 7—No. 28—.45″ caliber. Bottle-shaped, smooth short-lap, same as No. 27 but throat of case shortened .2″ and bullet inserted but .15″; wad of lubricant behind bullet to make up the length; no patch; case knurled into bullet. (F. A., No. 218.)

Fig. 8—No. 29—.45″ caliber. Bottle-shaped. Laidley bullet, short-lap; powder, 75 grains musket; bullet, cylindro-ellipsoidal; weight, 483 grains; length, 1″.25; length of cylindrical portion, .75″; diameter, .45″; five rectangular *cannelures* .06″ wide, beginning .2″ from base;

inter-*cannelures* .06″ wide; one narrow *cannelure* on the ellipsoidal portion, .45″ from front; diameter of cylindrical portion diminished to .44″ for .15″ from the base to allow for lap of case, diameter of bullet decreasing abruptly by .015″ at the junction of the cylindrical with the ellipsoidal portion; material lead, cast and swaged; *cannelures* turned in after swaging; case, copper, bottle-shaped, 1″.7 long; base same as service-case, (No. 1,) contraction to .45″ internal diameter at 1″.4 from base, lapping .15″ on bullet without crimp; priming, Frankfort Arsenal cup; lubrication, Japan wax in *cannelures* and wad behind the bullet, dipped in Japan wax and tallow. Total length of cartridge, 2″.8. Total weight, 727 grains. (F. A., No. 219.)

Fig. 8—No. 30—.45″ caliber. Laidley bullet, like No. 29, but with case .3″ longer in the neck and extending .3″ further on the bullet. Total length the same. Total weight, 743 grains. (F. A., No. 20.)

Fig. 10—No. 31—.45″ caliber. Dutch rifle-musket cartridge. Powder, musket-grain, dull, rounded, not uniform, 70 grains; bullet, lead, cast and swaged, cylindro-conoidal, flat fronted, weight 340 grains; length, .93″; length of cylindrical portion, .46″; diameter, .455″; diameter of flat front, .15″; one *cannelure* of segmental section .16″ wide, .045″ deep, beginning .12″ from base; case, brass, bottle-shaped, solid flange; length, 2″; diameter of flange, .67″; greatest exterior diameter of case, .58″; contraction begins 1″.25 from base; laps .45″ on bullet; priming, outside cap, continuous pocket; lubrication, wax in *cannelure* and a disk of tallow behind bullet; felt wad behind tallow. Total length of cartridge, 2″.5. Total weight, 725 grains. (F. A., No. 247.)

Fig. 11—No. 32—.42″ caliber. Russian-Berdan cartridge, made by Union Metallic Cartridge Company, of Bridgeport, Connecticut. Powder, Smith & Rand's "musket," 80 grains; bullet, lead, pressed, cylindro-ellipsoidal; weight, 375 grains; length of cylindrical portion, 0.77″. Total length, 1″.1; diameter, .42″; patched with two wraps of bank-note paper, extending .6″ on the bullet; case, brass, bottle-shaped, folded flange, with interior re-enforcing ring; length, 2″.25; diameter of flange, .64″; greatest exterior diameter of case, .515″; contraction begins 1″.7 from base; laps .35″ on bullet; priming, outside cap, with Berdan return-anvil pocket in base; lubrication, disk of stearine in paper capsule behind bullet; bullet end also dipped in stearine after completion. Total length, 3″. Total weight, 602 grains. (F. A., No. 159.)

Fig. 5—No. 33—.42″ caliber. Like No. 20, but with *cannelures* of bullet .02″ deep, and charge of 65 grains. (F. A., No. 252.)

Fig. 5—No. 34—.42″ caliber. Like No. 20, but with *cannelures* of bullet .02″ deep, and charge of 75 grains. (F. A., No. 253.)

Fig. 5—No. 35—.42″ caliber. Like No. 20, but with *cannelures* of bullet .02″ deep, and charge of 80 grains. (F. A., No. 254.)

Fig. 5—No. 36—.42″ caliber. Like No. 20, but with *cannelures* of bullet .02″ deep, and charge of 60 grains. (F. A., No. 255.)

Fig. 4 (*c*)—No. 37—.40″ caliber. Like No. 2, but with 60-grain charge and bullet with 5 *cannelures* .02″ deep; lubricated in *cannelures* only. (F. A., No. 256.)

Fig. 5—No. 38—.42″ caliber. Like No. 20, but with *cannelures* of bullet .02″ deep; weight, 365 grains, and charge of 65 grains. (F. A., No. 257.)

Fig. 12 (*a*)—No. 39—.45″ caliber. Straight case. Powder, 65 grains "musket"; bullet, 400 grains, lead blunt cylindro-ellipsoidal, with 4 rectangular *cannelures* .02″ deep; diameter, .455″; length, 1″.04; length of cylindrical portion, .6″; case, copper, 2″.18 long; diameters, .5″ to .475″; diameter of flange, .58″; priming, "Martin pocket;" lubrication, bayberry wax and graphite in *cannelures* only. Total length of cartridge, 2″.78. Total weight, 600 grains. (F. A., No. 258.)

Fig. 12 (*a*)—No. 40—.45″ caliber. Like No. 39, but with charge of 70 grains. (F. A., No. 259.)

Fig. 12 (*a*)—No. 41—.45″ caliber. Like No. 39, but with charge of 75 grains. (F. A., No. 260.)

Fig. 12 (*a*)—No. 42—.45″ caliber. Like No. 39, but with charge of 80 grains. (F. A., No. 261.)

Fig. 12 (*a*)—No. 43—.45″ caliber. Like No. 39, but with charge of 60 grains. (F. A., No. 262.)

Fig. 4 (*c*)—No. 44—.40″ caliber. Straight case. Powder, 65 grains "musket"; bullet lead, cast and swaged, blunt cylindro-ellipsoidal, 5 rectangular *cannelures* .02″ deep; length, 1″.1; diameter, .405″; length of cylindrical portion, .65″; weight, 340 grains; case, copper, 2″.5 long; diameters, .44″ to .43″; diameter of flange, .515″; case covers 3 *cannelures*; priming, "Martin pocket"; lubrication, bayberry-wax and graphite in *cannelures*. Total length of cartridge, 3″.18. Total weight, 545 grains. (F. A., No. 263.)

Fig. 13—No. 45— .40″ caliber. Like No. 44, but the bullet pressed in until the case covers four instead of three *cannelures*, making the total length of the cartridge 3″.11. (F. A., No. 264.)

Fig. 14—No. 46— .40″ caliber. Like No. 44, but the bullet pressed in until the case covers all the *cannelures* making the total length of the cartridge 3″. (F. A., No. 265.)

Fig. 12 (*b*)—No. 47— .45″ caliber. Like No. 39, but with 70-grain charge, and the bullet pressed in until all the *cannelures* were covered by the case, making the total length of the cartridge 2″.68. (F. A., No. 266.)

No. 48— .42″ caliber. Like No. 20, but with 65-grain charge, and 365-grain bullet with *cannelures* .02″ deep, entirely covered by the case, making the total length of the cartridge 3″. (F. A., No. 267.)

Fig. 15—No. 49— .42″ caliber. Like No. 20, but with 65-grain charge and 365-grain bullet with *cannelures* .02″ deep, entirely covered by the case, which is shortened .13″, making the total length of the cartridge 2″.8, and total weight 578 grains. (F. A., No. 268.)

Fig. 16—No. 50— .45″ caliber. Like No. 39, but with 70-grain charge,

and the bullet pressed in until all the *cannelures* are covered by the case, which is shortened .18″, making the total length of the cartridge 2″.5, and weight 593 grains. (F. A., No. 269.)

Fig. 18—No. 51.—Martini-Henry, English, .45″ caliber. Bullet lead, hardened with tin, cast and swaged, cylindro-conoidal; diameters of cylindrical portion, .45″ to .44″, length of do. .9″; total length of bullet, 1″.28; weight, 484 grains; cylindrical portion patched with two wraps of bank-note paper, one small *cannelure* .15″ from base for crimping only; powder, 85 grains "musket;" case, brass foil, extremely contracted or bottle-shaped, iron flange, separate priming-pocket and two re-enforcing base-cups outside; length, 2″.38; diameter of flange, .74″; diameter next to flange .65″, tapering to .6″ at 1″.2 from base, then suddenly contracting to about .47″ by 4 plaits, so as to embrace the bullet, which it does, for .5″ being secured by an annular crimp in the *cannelure* of the bullet; priming, outside cap and anvil, in an inserted pocket; lubrication, a thick disk of wax, between two disks of paste-board behind the bullet. Total length of cartridge, 3″.15; weight of cartridge, 767 grains. (F. A., No. 275.)

No. 52—Vetterlin-Swiss—.411″ caliber, (classed with .42″ cal. guns in Report.) Bullet lead, cast and swaged, cylindro-ellipsoidal; cylindrical portion .57″ long, with .35″ of its length at rear reduced from .42″ to .39″ diameter, to allow for lap of case; cavity in base .2″ deep; one large *cannelure* near base to facilitate expansion, two other smaller ones on the exposed portion of bullet to hold lubricant; no patch; total weight 312 grains. Powder, 60 grains "musket;" case, copper, slightly bottle-shaped; length, 1″.5; diameter of flange, .615″; diameter next to flange, .53″, tapering to .50″ in 1″., thence contracting by an easy curve to .42″ diameter, embracing the bullet for .35″; lubrication only by dipping; priming inside. Total length of cartridge, 2″.2. Weight, 464 grains. (F. A., No. 276.)

No. 53.—Werndl-Austrian—caliber, .425″, (classed with .42″ cal. guns in Report.) Bullet lead, cast cylindro-conoidal, two rectangular *cannelures*, both exposed; diameter of cylindrical portion, .43″; length of do., .5″; total length, .9″; weight, 318 gains; flat front, .1″ diameter; powder, 65 grains "musket," supplied by us, being as much as the case furnished would hold; case, copper, straight; length, 1″.6; diameter of flange, .59″; diameter next to flange, .51″; laps only .1″ on the bullet by a snug throat; lubrication in the exposed *cannelures*. Priming, outside cap. Total length of cartridge, 2″.4. Weight, 504 grains.

N. B.—This ammunition was made up in this country from bullets and primed cases furnished from Austria, by inserting as much powder as the case would contain, (65 grains.) The powder was the same as used in our own service-cartridge. (F. A., No. 277.)

Fig. 15.—No. 54—.42″ caliber. Like No. 20, but with 365-grain bullet, with *cannelures* .02″ deep, entirely covered by the case, which is shortened .2″, making the total length of the cartridge 2″.8. (F. A., No. 278.)

Fig. 15—No. 55—.42″ caliber. Like No. 20, but with 75-grain charge, and 365-grain bullet, with *cannelures* .02″ deep, entirely covered by the case, which is shortened .2″, making the total length of the cartridge 2″.8. (F. A., No. 279.)

No. 56—.45″ caliber. Bottled-shaped. For pressures, to compare with No. 50, straight case. Powder, 70 grains "musket;" bullet, 400 grains, 3 *cannelures* inserted .55″; case, bottled-shaped, contracted from ordinary .50″ caliber case to a .46″ throat, as in ammunition No. 29; lubrication in *cannelures*. (F. A., No. 270.)

No. 57—.42″ caliber. Bottle-shaped. For pressures, to compare with No. 49, straight case. Powder, 65 grains "musket;" bullet, 370 grains, 3 *cannelures*, inserted .55″; case, bottle-shaped, contracted from ordinary .50″ caliber case to a .43″ throat; lubrication in *cannelures*. (F. A., No. 271.)

Fig. 17—No. 58—.45″ caliber. Hardened bullet. Powder, 70 grains "musket;" bullet lead, hardened with $\frac{1}{13}$ tin, blunt cylindro-ellipsoidal, with 5 rectangular *cannelures;* length, 1″.11; diameter, .46″; length of cylindrical portion, .62″; width of *cannelures*, .075″; depth of *cannelures*, .03″; width of inter-*cannelures*, .05″; weight, 405 grains; case, copper, straight frustum; length, 2″.1; diameter of flange, .606″; diameter next to flange, .505″; diameter in front, .48″, covering all the *cannelures* of bullet; lubrication, bayberry wax and graphite in the *cannelures;* priming, inside, ("Martin pocket.") Total length of cartridge, 2.″6. Total weight, 604 grains. (F. A., No. 280.)

Fig. 14—No. 59—.40″ caliber. Hardened bullet. Like No. 44, but bullet hardened with $\frac{1}{13}$ tin and pressed in until the case covers all the *cannelures*, making the total length of the cartridge 3″. Total weight of cartridge, 542 grains. (F. A., No. 283.)

Fig. 14—No. 60—.40″ caliber. Hardened bullet, same as last, but charge increased from 65 grains to 70 grains. (F. A., No. 284.)

APPENDIX A.—TABLES OF FIRING.

TABLE No. 1.—*Forty caliber at 500 yards—targets of 20 shots.*

Number of target.	Gun.			Ammunition.				Lubrication.	Shots since last cleaned.	Wind.	Mean deviation.	Corrected angle.	Date, post, and record number.	Remarks.
	Number.	Twist.	Chamber.	Number.	Weight of powder.	Weight of bullet.	Form of bullet.							
		"			grs.	grs.					"	° ′ ″	1872.	
1	3	18	Straight.	24	70	290	Smooth, patched.	Greased patch.	0	.....	14.3	53 57	May 18, S. A., 156	
2	3	18	...do	24	70	290	...do	...do	0	.....	Wild	.....	May 22, S. A., 161	Only 10 shots fired; not reduced.
3	3	18	...do	2	80	350	...do	...do	0	Strong from right rear.	16.0	53 11	May 27, S. A., 167	Gun badly fouled and leaded.
4	3	18	...do	3	75	350	...do	...do	0	Strong from left rear.	16.9	52 48	June 1, S. A., 169	Do.
5	3	18	...do	4	70	350	...do	...do	0	...do	15.0	55 30	June 1, S. A., 171	Gun badly fouled.
6	3	18	...do	5	65	350	...do	...do	0	Light from right rear.	15.3	1 0 15	June 7, S. A., 173	Gun badly fouled and leaded.
7	3	18	...do	6	80	350	...do	Greased patch and dipped.	8	Light from right	20.9	45 35	June 7, S. A., 176	Gun but little fouled and not leaded.
8	3	18	...do	7	75	350	...do	...do	8	Light, shifting right front to right rear.	21.8	46 37	June 7, S. A., 177	Do.
9	3	18	...do	8	70	350	...do	...do	8	...do	11.3	53 13	June 7, S. A., 178	Do.
10	3	18	...do	9	65	350	...do	...do	8	Light from right	12.0	57 36	June 7, S. A., 175	Do.
11	3	18	...do	10	80	400	7 cannelures	In cannelures.	0	Calm; rain	22.5	48 42	June 8, S. A., 179	Gun little fouled and very slightly leaded.
12	3	18	...do	11	75	350	4 cannelures	...do	0	Calm; moist	14.2	50 52	June 8, S. A., 181	Gun moderately fouled; good deal leaded.
13	3	18	...do	12	70	350	...do	...do	0	...do	11.2	54 10	June 8, S. A., 182	Gun but little fouled; trace of lead.
14	3	18	...do	13	65	350	...do	...do	0	...do	9.2	59 11	June 8, S. A., 183	Gun but little fouled; good deal leaded.
15	3	18	...do	14	70	350	5 cannelures	In cannelures and dipped.	0	Light from left front	13.7	56 58	June 18, S. A., 184	Gun but slightly fouled and not leaded.
16	3	18	...do	15	65	350	...do	...do	0	...do	17.9	1 1 43	June 18, S. A., 185	Do.
17	3	18	...do	16	70	350	...do	In cannelures.	0	Light from right rear.	16.1	59 23	June 24, S. A., 186	Gun very badly fouled and leaded.
18	3	18	...do	17	65	350	...do	...do	0	Light from left front; rain.	7.8	1 1 19	June 25, S. A., 187	Gun not cleaned for next target.
19	3	18	...do	17	65	350	...do	...do	20	Calm	7.5	59 26	June 25, S. A., 188	Do.
20	3	18	...do	17	65	350	...do	...do	40	Calm; rain	10.5	1 0 20	June 25, S. A., 189	Do.
21	3	18	...do	17	65	350	...do	...do	60	...do	7.45	59 0	June 25, S. A., 190	Do.
22	3	18	...do	17	65	350	...do	...do	80	Light from left front; rain.	18.6	59 36	June 25, S. A., 191	Gun good deal fouled and leaded by 100 shots.

23	3	18	...do	16	70	350	...do	...do	0	Calm	18.7	55 54	June 27, S. A., 192	Gun not cleaned for next target.
24	3	18	...do	16	70	350	...do	...do	20	...do	22.1	56 1	June 27, S. A., 193	Do.
25	3	18	...do	16	70	350	...do	...do	40	...do	29.1	56 22	June 27, S. A., 194	Gun considerably fouled and leaded by 60 shots.
26	3	18	...do	18	60	350	...do	...do	0	Light from right rear	8.8	1 8 27	June 27, S. A., 195	Gun moderately fouled and good deal leaded.
27	3	18	...do	17	65	350	...do	...do	0	...do	13.4	1 0 35	July 3, S. A., 201	Gun not cleaned for next target.
28	3	18	...do	17	65	350	...do	...do	20	...do	19.9	1 0 58	July 3, S. A., 202	Do.
29	3	18	...do	17	65	350	...do	...do	40	...do	34.0; 2 misses.	1 3 48	July 3, S. A., 203	Gun much fouled and leaded by 60 shots.
30	3	18	...do	17	65	350	...do	...do	0	...do	12.5	57 11	July 3, S. A., 205	Gun not cleaned for next target.
31	3	18	...do	17	65	350	...do	...do	20	...do	Wild; 4 misses.	.....	July 3, S. A., 206	Only 18 shots fired; much leaded.
32	3	18	...do	19	65	340	5 cannelures, .02″ deep.	...do	0	Light from left rear	11.8	58 37	July 5, S. A., 207	Gun not cleaned for next target.
33	3	18	...do	19	65	340	...do	...do	20	...do	10.5	59 37	July 5, S. A., 209	Do.
34	3	18	...do	19	65	340	...do	...do	46	Calm	12.3	1 0 8	July 5, S. A., 216	Do.
35	3	18	...do	19	65	340	...do	...do	67	Light from front	13.1	58 58	July 6, S. A., 219	Do.
36	3	18	...do	19	65	340	...do	...do	87	...do	12.5; 2 misses.	57 28	July 6, S. A., 221	Gun entirely clean after 107 shots.
37	3	18	...do	37	60	340	...do	...do	4	Strong from left front; gusty.	7.7	59 10	July 13, S. A., 231	Gun very clean after 24 shots.
38	12	18	...do	44	65	340	...do	...do	0	Calm	15.1	56 57	Aug. 24, S. A., 267	(Henry barrel.)
39	12	18	...do	44	65	340	...do	...do	6	Strong from left front	15.4	1 1 25	Aug. 28, S. A., 274	Gun not cleaned for next target, (Henry.)
40	12	18	...do	44	65	340	...do	...do	26	...do	15.1	1 0 14	Aug. 28, S. A., 275	Do.
41	12	18	...do	44	65	340	...do	...do	46	...do	11.3	1 0 56	Aug. 28, S. A., 276	Do.
42	12	18	...do	44	65	340	...do	...do	68	Calm	13.8	1 0 27	Aug. 28, S. A., 277	Do.
43	12	18	...do	44	65	340	...do	...do	88	...do	13.1	1 1 22	Aug. 28, S. A., 278	Condition after 108 shots—quite clean.
44	3	18	...do	46	65	340	...do	...do	0	Fresh from left	11.7	58 54	Sept. 4, S. A., 284	
45	3	18	...do	45	65	340	...do	...do	0	Strong from left	13.3	58 23	Sept. 4, S. A., 285	
46	3	18	...do	44	65	340	...do	...do	0	...do	14.9	59 34	Sept. 4, S. A., 286	
47	3	18	...do	46	65	340	...do	...do	0	...do	17.9	58 40	Sept. 4, S. A., 287	These three targets were fired by alternate shots.
48	3	18	...do	45	65	340	...do	...do	0	...do	13.4	56 59	Sept. 4, S. A., 288	
49	3	18	...do	44	65	340	...do	...do	0	...do	18.0	58 43	Sept. 4, S. A., 289	
50	9	18	...do	46	65	340	...do	...do	0	Light; variable	16.8	1 0 58	Sept. 6, S. A., 290	Light barrel.
51	9	18	...do	46	65	340	...do	...do	0	Light from right rear	14.6	58 24	Sept. 6, S. A., 291	Do.
52	9	18	...do	46	65	340	...do	...do	0	...do	18.6	1 1 32	Sept. 6, S. A., 292	Do.
53	13	18	...do	46	65	340	...do	...do	3	Light from front	9.2	1 1 51	Sept. 7, S. A., 307	Light barrel, short throat; gun not cleaned for next target.
54	13	18	...do	46	65	340	...do	...do	23	...do	13.8	59 27	Sept. 7, S. A., 308	Do.
55	13	18	...do	46	65	340	...do	...do	43	...do	8.9	56 53	Sept. 7, S. A., 309	Do.
56	13	18	...do	46	65	340	...do	...do	64	...do	12.6	57 17	Sept. 7, S. A., 310	Do.
57	13	18	...do	46	65	340	...do	...do	84	...do	7.3	58 9	Sept. 7, S. A., 311	Very clean after 104 shots.
58	14	18	...do	45	65	340	...do	...do	0	Calm	15.8	56 10	Oct. 18, S. A., 327	Light barrel, medium throat; gun not cleaned for next target.

TABLE No. 1.—*Forty caliber at 500 yards—targets of 20 shots*—Continued.

Number of target.	Gun.			Ammunition.				Lubrication.	Shots since last cleaned.	Wind.	Mean deviation.	Corrected angle.	Date, post, and record number.	Remarks.
	Number.	Twist.	Chamber.	Number.	Weight of powder.	Weight of bullet.	Form of bullet.							
		"			grs.	grs.					"	° ′ ″	1872.	
59	14	18	Straight.	45	65	340	5 cannelures, .02″ deep.	In cannelures	20	Calm	15.8	57 36	Oct. 18, S. A., 328	Light barrel, medium throat; gun not cleaned for next target.
60	14	18	do	45	65	340	do	do	40	do	18.2	57 40	Oct. 18, S. A., 329	Do.
61	14	18	do	45	65	340	do	do	60	do	24.7	56 17	Oct. 18, S. A., 330	Do.
62	14	18	do	45	65	340	do	do	80	do	24.4	57 54	Oct. 18, S. A., 331	Fouled and leaded by 100 rounds.
63	13	18	do	46	65	340	do	do	0	do	19.3	1 0 44	Oct. 18, S. A., 332	
64	13	18	do	46	65	340	do	do	0	Light from left front	11.9	54 20	Oct. 25, S. A., 338	Short throat, short cartridge.
65	9	18	do	46	65	340	do	do	0	Light from front	21.8	59 48	Oct. 25, S. A., 339	Long throat, short cartridge.
66	14	18	do	46	65	340	do	do	0	do	13.7	57 27	Oct. 25, S. A., 340	Medium throat, short cartridge.
67	13	18	do	46	65	340	do	do	0	Strong from left	13.5	58 25	Dec. 4, S. A., 387	Gun not cleaned for next target.
68	13	18	do	46	65	340	do	do	20	do	13.9	1 0 14	Dec. 4, S. A., 388	Do.
69	13	18	do	46	65	340	do	do	40	Strong from left rear	19.8	1 1 36	Dec. 4, S. A., 389	Do.
70	13	18	do	46	65	340	do	do	60	do	19.3	59 5	Dec. 4, S. A., 390	Do.
71	13	18	do	46	65	340	do	do	80	Light from left rear	12.2	1 0 13	Dec. 4, S. A., 391	Gun clean after 100 shots.
													1873.	
72	13	18	do	59	65	340	5 cannelures	do	0	Light from left front	9.3	1 0 49	Jan. 2, S. A., 423	Hardened bullet; gun not cleaned for next target.
73	13	18	do	59	65	340	do	do	20	do	10.3	1 0 9	Jan. 2, S. A., 424	Do.
74	13	18	do	59	65	340	do	do	40	do	9.6	59 47	Jan. 2, S. A., 425	Do.
75	13	18	do	59	65	340	do	do	60	do	12.2	59 49	Jan. 2, S. A., 426	Do.
76	13	18	do	59	65	340	do	do	80	do	9.7	59 22	Jan. 2, S. A., 427	Rather fouled and a little leaded by 100 shots.
77	13	18	do	60	70	340	do	do	0	Calm	11.4	49 50	Jan. 3, S. A., 428	Hardened bullet; gun not cleaned for next target.
78	13	18	do	60	70	340	do	do	20	do	15.3	49 4	Jan. 3, S. A., 429	Do.
79	13	18	do	60	70	340	do	do	40	do	12.2	48 41	Jan. 3, S. A., 430	Do.
80	13	18	do	60	70	340	do	do	60	do	7.7	48 22	Jan. 3, S. A., 431	Do.
81	13	18	do	60	70	340	do	do	80	Stiff from right rear	14.2	47 54	Jan. 4, S. A., 432	But little fouled or leaded by 100 shots.

Forty caliber at 800 yards—targets of 20 shots. Fired from shoulder and rest.

82	3	18	Straight.	44	65	340	5 cannelures, .02″ deep.	In cannelures.	0	Strong from right rear.	25.7	1 59 49	1872. Aug. 6, S. A., 259	
83	3	18	...do	44	65	340	...do	...do	0	Light from right rear.	23.3	1 44 36	Aug. 8, S. A., 261	
84	13	18	...do	46	65	340	...do	...do	0	Calm	32.2; 7 misses.	2 7 5	Dec. 7, S. A., 401	Fouled and leaded by 32 shots.
85	13	18	...do	60	70	340	...do	...do	0	Light breeze from left rear.	21.6	1 53 21	1873. Jan. 17, S. A., 439	Hardened bullet.
86	13	18	...do	60	70	340	...do	...do	20	...do	26.5	1 51 41	Jan. 17, S. A., 440	Do.
87	13	18	...do	60	70	340	...do	...do	40	...do	33.6; 2 misses.	1 53 13	Jan. 17, S. A., 441	Hardened bullet; fouled and leaded.

Forty caliber at 1,050 yards—targets of 20 shots. Fired from shoulder and rest.

88	3	18	Straight.	44	65	340	5 cannelures	In cannelures.	5	Calm	43 4	3 25 12	1872. Aug. 24, S. A., 268	Gun not cleaned for next target.
89	3	18	...do	44	65	340	...do	...do	27	...do	50.3	3 10 16	Aug. 24, S. A., 269	Do.
90	3	18	...do	44	65	340	...do	...do	50	...do	53.3	3 5 44	Aug. 24, S. A., 270	Condition.

TABLE NO. 2.—*Forty-two caliber at 500 yards—targets of 20 shots.*

1	4	18	Straight.	20	70	370	4 cannelures	In cannelures.	0	Fresh from right rear.	Wild	Not reduced.	July 8, S. A., 222	Gun much fouled and leaded.
2	4	18	...do	21	75	370	...do	...do	0	...do	...do	...do	July 8, S. A., 223	Do.
3	4	18	...do	22	80	370	...do	...do	0	...do	...do	...do	July 8, S. A., 224	Do.
4	4	18	...do	23	70	370	4 cannelures, .02″ deep.	...do	0		9.26	1 2 11	July 9, S. A., 225	Gun quite clean.
5	7	20	Bottle	32	80	375	Smooth patched.	Base and dipped.	0	Light breeze from right of rear.	9.1	1 1 47	Aug. 22, F. A., 1338	8 grains fouling, (Russian.)
6	7	20	...do	32	80	375	...do	...do	0	...do	11.7	1 1 7	Aug. 22, F. A., 1339	9.7 grains fouling.
7	7	20	...do	32	80	375	...do	...do	0	Light breeze, in puffs.	12.5	1 2 27	Aug. 22, F. A., 1340	7 grains fouling.
8	7	20	...do	32	80	375	...do	...do	0	Light breeze rear of right.	10.0	1 2 27	Aug. 22, F. A., 1341	6 grains fouling.
9	7	20	...do	32	80	375	...do	...do	0	Light breeze from right	11.9	1 2 53	Aug. 22, F. A., 1342	Gun not clean for next target.
10	7	20	...do	32	80	375	...do	...do	22	Faint breeze from rear of right.	17.5	1 2 36	Aug. 22, F. A., 1343	Do.
11	7	20	...do	32	80	375	...do	...do	44	Faint breeze from right of rear.	15.0	1 3 13	Aug. 22, F. A., 1344	Do.
12	7	20	...do	32	80	375	...do	...do	66	...do	14.7	1 4 31	Aug. 22, F. A., 1345	18 grains fouling by 88 shots.
13	4	18	Straight.	33	65	370	4 cannelures	In cannelures.	3	Light from rear; variable.	9.07		July 11, S. A., 226	Considerably fouled and a little leaded.
14	4	18	...do	34	75	370	...do	...do	4	Gusty from left rear; changing.	19.2		July 11, S. A., 227	But little fouled or leaded.
15	4	18	...do	35	80	370	...do	...do	0	Light from left	26.5		July 11, S. A., 228	Considerably fouled and leaded.

TABLE No. 2.—*Forty-two caliber at 500 yards—targets of 20 shots*—Continued.

Number of target.	Gun.			Ammunition.				Lubrication.	Shots since last cleaned.	Wind.	Mean deviation.	Corrected angle.	Date, post, and record number.	Remarks.
	Number.	Twist.	Chamber.	Number.	Weight of powder.	Weight of bullet.	Form of bullet.							
		"			grs.	grs.					"	° ′ ″	1872.	
16	4	18	Straight.	36	60	370	4 cannelures	In cannelures	3	Light from left front; gusty.	6.9		July 11, S. A., 230	But little fouled; not leaded.
17	4	18	...do	38	65	365	...do	...do	0	Calm	10.3	1 9 1	July 18, S. A., 232	Gun not cleaned for next target.
18	4	18	...do	38	65	365	...do	...do	22	Light from left front	10.6	1 7 32	July 18, S. A., 232½	Do.
19	4	18	...do	38	65	365	...do	...do	42	...do	9.2	1 7 29	July 18, S. A., 233	Do.
20	4	18	...do	38	65	365	...do	...do	62	Light from right front.	7.7	1 7 5	July 18, S. A., 234	Do.
21	4	18	...do	38	65	365	...do	...do	84	Light from right; variable.	12.0	1 6 31	July 18, S. A., 235	Quite clean after 104 shots.
22	10	20	...do	38	65	365	...do	...do	11	Strong from left rear; shifting.	14.5	1 9 3	Aug. 31, S. A., 279	Gun not cleaned for next target; light barrel.
23	10	20	...do	38	65	365	...do	...do	33	Strong from left rear; shifting and variable.	13.8	1 7 20	Aug. 31, S. A., 280	Do.
24	10	20	...do	38	65	365	...do	...do	59	...do	15.0	1 7 11	Aug. 31, S. A., 281	Do.
25	10	20	...do	38	65	365	...do	...do	81	...do	12.3	1 8 6	Aug. 31, S. A., 282	Do.
26	10	20	...do	38	65	365	...do	...do	102	...do	13.5	1 6 25	Aug. 31, S. A., 283	Gun very clean after 122 shots.
27	10	20	...do	48	65	365	...do	...do	2	Strong from left	12.0	1 6 58	Sept. 9, S. A., 298	Gun not cleaned for next target.
28	10	20	...do	48	65	365	...do	...do	22	...do	11.8	1 6 25	Sept. 9, S. A., 303	Do.
29	10	20	...do	48	65	365	...do	...do	42	Strong from left front.	12.8	1 8 2	Sept. 9, S. A., 304	Do.
30	10	20	...do	48	65	365	...do	...do	63	...do	11.1	1 8 53	Sept. 9, S. A., 305	Do.
31	10	20	...do	48	65	365	...do	...do	83	...do	12.6	1 7 49	Sept. 9, S. A., 306	Gun very clean after 103 shots.
32	15	20	...do	49	65	365	...do	...do	0	Shifting from right	13.4		Sept. 21, S. A., 317	Gun not cleaned for next target.
33	15	20	...do	49	65	365	...do	...do	20	...do	18.4; 1 miss.		Sept. 21, S. A., 318	Do.
34	15	20	...do	49	65	365	...do	...do	40	From rear	13.3		Sept. 21, S. A., 319	
35	10	20	...do	49	65	365	...do	...do	0	From left	16.0		Sept. 21, S. A., 320	
36	15	20	...do	49	65	365	...do	...do	0	Shifting	16.0	1 17 9	Oct. 12, S. A., 322	Gun not cleaned for next target.
37	15	20	...do	49	65	365	...do	...do	20	...do	14.2	1 17 4	Oct. 12, S. A., 323	Do.
38	15	20	...do	49	65	365	...do	...do	40	...do	13.6	1 16 45	Oct. 12, S. A., 324	Do.

39	15	20	...do	49	65	365	.....do	.....do	60	.....do	13.9.....	1 16 53	Oct. 12, S. A., 325	Do.
40	15	20	...do	49	65	365	.....do	.....do	80	.....do	14.2.....	1 16 44	Oct. 12, S. A., 326	But slightly fouled by 110 shots.
41	18	26.5	Slightly bottle.	52	60	312	2 cannelures; both exposed.	Dipped only...	0	Strong from right rear.	21.9.....	1 27 36	Nov. 9, S. A., 351	Vetterlin, Swiss, cal. .411″.
42	18	26.5	...do	52	60	312	.....do	.....do	20	.....do	21.9.....	1 26 8	Nov. 9, S. A., 352	Do.
43	18	26.5	...do	52	60	312	.....do	.....do	40	.....do	20.2.....	1 20 48	Nov. 9, S. A., 353	Do.
44	18	26.5	...do	52	60	312	.....do	.....do	60	.....do	23.0.....	1 21 53	Nov. 9, S. A., 354	Do.
45	18	26.5	...do	52	60	312	.....do	.....do	80	Stiff from right rear ..	25.9.....	1 27 21	Nov. 9, S. A., 355	Quite clean after 100 shots.
46	19	28	Straight.	53	65	318	2 cannelures.....	In cannelures .	0	Very light from right rear.	34.6; 1 miss.	1 20 27	Nov. 16, S. A., 359	Werndl, Austrian, cal. .425″.
47	19	28	...do	53	65	318	.....do	.....do	21	.....do	36.1; 2 misses.	1 18 28	Nov. 16, S. A., 360	Do.
48	19	28	...do ...	53	65	318	.....do	.....do	43	.....do	30.6; 2 misses.	1 20 25	Nov. 16, S. A., 361	Do.
49	19	28	...do	53	65	318	.....do	.....do	63	.....do	Wild; 7 misses.	Not reduced.	Nov. 16, S. A., 362	Do.
50	19	28	...do	53	65	318	.....do	.....do	83	.....do	Wild; 8 misses.	...do	Nov. 16, S. A., 363	Much fouled and slightly leaded by 103 shots.
51	15	20	...do	54	70	365	4 cannelures	.....do	0	Calm	16.9.....	1 7 38	Nov. 22, S. A., 365	
52	15	20	...do	55	75	365	.....do	.....do	0	.....do	20.1.....	1 5 28	Nov. 22, S. A., 366	
53	15	20	...do	49	65	365	.....do	.....do	0	.....do	10.0.....	1 13 38	Nov. 22, S. A., 364	
54	20	24	...do	54	70	365	.....do	.....do	2	.....do	8.6.....	1 3 23	Nov. 26, S. A., 367	Gun not cleaned for next target.
55	20	24	...do	54	70	365	.....do	.....do	22	Light breeze from left front.	11.4.....	1 4 6	Nov. 26, S. A., 368	Do.
56	20	24	...do	54	70	365	.....do	.....do	41	.....do	14.1.....	1 4 7	Nov. 26, S. A., 369	Do.
57	20	24	...do	54	70	365	.....do	.....do	61	Calm	15.0.....	1 4 1	Nov. 27, S. A., 370	Do.
58	20	24	...do	54	70	365	.....do	.....do	81	.....do	14.8.....	1 4 58	Nov. 27, S. A., 371	Gun slightly fouled by 101 shots.
59	20	24	...do	54	70	365	.....do	.....do	0	Light breeze from right rear.	12.4.....	1 4 3	Dec. 3, S. A., 377	Gun not cleaned for next target.
60	20	24	...do	54	70	365	.....do	.....do	20	....do	12.1.....	1 4 17	Dec. 3, S. A., 378	Do.
61	20	24	...do	54	70	365	.....do	.....do	40	....do	13.2.....	1 2 59	Dec. 3, S. A., 379	Do.
62	20	24	...do	54	70	365	.....do	.....do	60	Calm	13.0.....	1 4 18	Dec. 3, S. A., 380	Do.
63	20	24	...do	54	70	365	.....do	.....do	80	....do	14.0.....	1 5 14	Dec. 3, S. A., 381	Gun slightly fouled by 100 shots.
64	7	20	Bottle...	32	80	375	Smooth	Base and dipp'd	0	....do	12.6.....	1 0 10	Dec. 3, S. A., 382	Russian-Berdan.
65	7	20	...do	32	80	375	.....do	.....do	20	....do	15.1.....	1 0 40	Dec. 3, S. A., 383	Do.
66	7	20	...do	32	80	375	.....do	.....do	40	....do	13.6.....	59 53	Dec. 3, S. A., 384	Do.
67	7	20	...do	32	80	375	.....do	.....do	60	....do	16.8.....	59 27	Dec. 3, S. A., 385	Do.
68	7	20	...do	32	80	375	.....do	.....do	80	....do	16.4.....	59 36	Dec. 3, S. A., 386	Gun foul and leaded by 100 rounds.

Forty-two caliber at 800 yards—targets of 20 shots. Fired from shoulder and rest.

69	4	18	Straight.	33	65	365	4 cannelures	In cannelures.	0	Light from right rear .	22.0.....	2 4 27	Aug. 8, S. A., 260	
70	20	24	...do	54	70	365	.....do	.....do	0	Calm	21.8; 2 misses.	2 11 15	Dec. 7, S. A., 400	
71	7	20	Bottle...	32	80	375	Smooth	Base & dipped.	0	....do	26.7; 7 misses.	2 7 3	Dec. 7, S. A., 399	Russian-Berdan.

TABLE No. 2.—*Forty-two caliber at 1,050 yards—targets of 20 shots. Fired from shoulder and rest*—Continued.

Number of target.	Gun.			Ammunition.				Lubrication.	Shots since last cleaned.	Wind.	Mean deviation.	Corrected angle.	Date, post, and record number.	Remarks.
	Number.	Twist.	Chamber.	Number.	Weight of powder.	Weight of bullet.	Form of bullet.							
		"			grs.	grs.					"	° ′ ″	1872.	
72	4	18	Straight.	33	65	370	4 cannelures	In cannelures	0	Light from right	47.4	3 29 36	Aug. 22, S. A., 266	
73	4	18	...do	33	65	370	...do	...do	4	Calm	41.9	3 26 59	Aug. 26, S. A., 271	Gun not cleaned for next target.
74	4	18	...do	33	65	370	...do	...do	30	...do	32.7	3 18 38	Aug. 26, S. A., 272	Do.
75	4	18	...do	33	65	370	...do	...do	53	...do	56.5	3 24 1	Aug. 26, S. A., 273	
76	7	20	Bottle	32	80	375	Smooth	Base & dipped.	0	...do	73.2; 3 misses.	3 36 32	Dec. 16, S. A., 411	Russian-Berdan.

TABLE No. 3.—*Forty-five caliber at 500 yards—targets of 20 shots.*

1	2	23	Bottle	25	75	440	3 cannelures	In cannelures and dipped.	4	Light from right rear.	11.1	1 5 13	July 3, S. A., 204	Only 16 shots fired.
2	2	23	...do	25	75	440	...do	...do	0	Light from left	10.2	1 4 19	July 5, S. A., 211	Gun not cleaned for next target.
3	2	23	...do	25	75	440	...do	...do	20	Stiff, right and left rear, shifting.	11.0	1 3 45	July 5, S. A., 213	Do.
4	2	23	...do	25	75	440	...do	...do	40	Light from front	9.5	1 6 46	July 5, S. A., 215	Do.
5	2	23	...do	25	75	440	...do	...do	60	Light from left front	10.9	1 7 32	July 6, S. A., 218	Do.
6	2	23	...do	25	75	440	...do	...do	80	Light from right front.	10.7	1 5 48	July 6, S. A., 220	Gun quite clean after 100 shots.
7	2	23	...do	25	75	440	...do	...do	0	...do	11.4	1 5 1	June 3, F. A., 1266	2 grains fouling.
8	2	23	...do	25	75	440	...do	...do	0	...do	9.3	1 6 0	June 3, F. A., 1271	Do.
9	2	23	...do	25	75	440	...do	...do	0	Light from rear	10.8	1 6 12	June 17, F. A., 1276	4.4 grains fouling.
10	2	23	...do	25	75	440	...do	...do	0	Light from right rear.	12.6	1 2 23	June 17, F. A., 1281	5 grains fouling.
11	2	23	...do	25	75	440	...do	...do	0	Light from left front	14.2	1 7 11	June 25, F. A., 1290	3 grains fouling.
12	2	23	...do	25	75	440	...do	...do	0	Light from left	11.3	1 9 7	June 25, F. A., 1292	Do.
13	2	23	...do	25	75	440	...do	...do	0	Light from right front.	9.9	1 3 18	June 27, F. A., 1294	Clean—wind in puffs.
14	2	23	...do	25	75	440	...do	...do	0	...do	12.2	1 5 2	June 27, F. A., 1296	Clean.
15	2	23	...do	26	75	440	3 cannelures, 2 exposed.	...do	0	Calm	17.5	1 4 24	June 3, F. A., 1265	3 grains fouling.
16	2	23	...do	26	75	440	...do	...do	0	Light from right front	17.4	1 6 26	June 3, F. A., 1270	9 grains fouling.

17	2	23	...do	26	75	440	...do	...do	0	Light from right rear.	20.4	1	3	30	June 17, F. A., 1275	5 grains fouling.
18	2	23	...do	26	75	440	...do	...do	0	Light from right front.	15.2	1	5	41	June 17, F. A., 1280	6.4 grains fouling.
19	2	23	...do	27	75	425	Smooth, patched.	Base and dipp'd	0	Light from front	15.7	1	6	5	June 3, F. A., 1267	12 grains fouling.
20	2	23	...do	27	75	425	...do	...do	0	Light from right front.	12.7	1	4	34	June 3, F. A., 1272	6 grains fouling.
21	2	23	...do	27	75	425	...do	...do	0	Light from right rear.	18.0	1	1	34	June 17, F. A., 1278	3 grains fouling.
22	2	23	...do	28	75	425	Smooth, 6-7 exposed.	...do	0	Light from right	22.9		59	55	June 17, F. A., 1277	5 grains fouling.
23	2	23	...do	28	75	425	...do	...do	0	Calm	19.6	1	3	52	June 17, F. A., 1282	6.6 grains fouling.
24	2	23	...do	29	75	483	6 cannelures, all exposed.	In cannelures and dipped.	0	Light from left front	16.9	1	7	14	June 25, F. A., 1289	4 grains fouling.
25	2	23	...do	29	75	483	...do	...do	0	...do	11.4	1	6	3	June 25, F. A., 1291	1 grain fouling.
26	2	23	...do	29	75	483	...do	...do	0	Light from right front.	14.8	1	1	6	June 27, F. A., 1293	Clean—wind in puffs.
27	2	23	...do	29	75	483	...do	...do	0	...do	15.1	1	1	48	June 27, F. A., 1295	Clean.
28	5	18	...do	29	75	483	...do	...do	0	Fresh from left of rear.	12.7	1	2	20	July 24, F. A., 1305	Gun not cleaned for next target.
29	5	18	...do	29	75	483	...do	...do	23	...do	13.8	1	2	49	July 24, F. A., 1306	Do.
30	5	18	...do	29	75	483	...do	...do	46	...do	11.7	1	3	30	July 24, F. A., 1307	Do.
31	5	18	...do	29	75	483	...do	...do	66	...do	11.8	1	2	41	July 24, F. A., 1308	2 grains fouling from 86 shots.
32	6	30	...do	31	70	340	1 cannelure	In cannelures and disk.	0	Light from right front.	21.8		58	32	Aug. 12, F. A., 1316	6 grains fouling. (Dutch.)
33	6	30	...do	31	70	340	...do	...do	0	...do	16.3		56	46	Aug. 12, F. A., 1318	8 grains fouling. (Dutch.)
34	6	30	...do	31	70	340	...do	...do	0	Light from right	16.5		59	26	Aug. 13, F. A., 1321	7 grains fouling. (Dutch.)
35	6	30	...do	31	70	340	...do	...do	0	Light from right front.	12.0		56	34	Aug. 13, F. A., 1323	Do.
36	6	30	...do	31	70	340	...do	...do	0	Light from right	15.5		58	48	Aug. 17, F. A., 1328	Gun not cleaned for next target. (Dutch.)
37	6	30	...do	31	70	340	...do	...do	22	...do	14.5		55	59	Aug. 17, F. A., 1330	Do.
38	6	30	...do	31	70	340	...do	...do	46	...do	15.3		57	2	Aug. 17, F. A., 1332	Do.
39	6	30	...do	31	70	340	...do	...do	68	...do	16.1		56	40	Aug. 17, F. A., 1334	13 grains fouling from 90 shots.
40	6	30	...do	31	70	340	...do	...do	0	Calm	16.0		58	3	Aug. 3, S. A., 254	Gun not cleaned for next target. (Dutch.)
41	6	30	...do	31	70	340	...do	...do	20	...do	16.0		56	8	Aug. 3, S. A., 255	Do.
42	6	30	...do	31	70	340	...do	...do	40	...do	19.6		57	9	Aug. 3, S. A., 256	Do.
43	6	30	...do	31	70	340	...do	...do	60	...do	15.5		59	18	Aug. 3, S. A., 257	Do.
44	6	30	...do	31	70	340	...do	...do	80	...do	18.4		56	38	Aug. 3, S. A., 258	Badly fouled and leaded by 100 shots.
45	8	18	Straight	39	65	400	4 cannelures	In cannelures.	6	Strong from left front.	11.3	1	3	37	July 24, S. A., 236	Very clean after 26 shots.
46	8	18	...do	40	70	400	...do	...do	0	Light from left front	9.9	1	1	55	July 24, S. A., 237	Very clean after 20 shots.
47	8	18	...do	41	75	400	...do	...do	0	...do	13.1		55	2	July 24, S. A., 238	Do.
48	8	18	...do	42	80	400	...do	...do	0	...do	12.1		58	25	July 24, S. A., 239	But little fouled or leaded.
49	8	18	...do	43	60	400	...do	...do	0	Strong; variable	12.7	1	2	40	July 25, S. A., 240	Very clean after 20 shots.
50	8	18	...do	39	65	400	...do	...do	4	Light from right; variable.	11.7	1	5	47	July 29, S. A., 241	Gun not cleaned for next target.
51	8	18	...do	39	65	400	...do	...do	25	...do	13.6	1	3	24	July 29, S. A., 242	Do.
52	8	18	...do	39	65	400	...do	...do	45	Light from right and rear; variable.	10.6	1	4	31	July 29, S. A., 243	Do.
53	8	18	...do	39	65	400	...do	...do	65	...do	12.7	1	3	51	July 29, S. A., 244	Quite clean after 85 shots.
54	8	18	...do	40	70	400	...do	...do	0	Very light from right rear.	10.3		56	10	July 31, S. A., 245	Gun not cleaned for next target.
55	8	18	...do	40	70	400	...do	...do	23	Light from right rear.	7.3		59	15	July 31, S. A., 246	Do.
56	8	18	...do	40	70	400	...do	...do	44	...do	13.4		59	9	July 31, S. A., 247	Do.
57	8	18	...do	40	70	400	...do	...do	64	Calm; rain	18.7	1	0	45	July 31, S. A., 248	But little fouled, and not leaded by 84 shots.

TABLE No. 3.—*Forty-five caliber at 500 yards—targets of 20 shots*—Continued.

Number of target.	Gun.			Ammunition.				Lubrication.	Shots since last cleaned.	Wind.	Mean deviation.	Corrected angle.	Date, post, and record number.	Remarks.
	Number.	Twist.	Chamber.	Number.	Weight of powder.	Weight of bullet.	Form of bullet.							
		"			grs.	grs.					"	° ′ ″	1872.	
58	11	22	Straight	47	70	400	4 cannelures	In cannelures.	5	Light from right rear.	10.2	1 1 11	Sept. 6, S. A., 293	Gun not cleaned for next target.
59	11	22	...do	47	70	400	...do	...do	25	...do	16.4	1 2 50	Sept. 6, S. A., 294	Do.
60	11	22	...do	47	70	400	...do	...do	45	...do	8.2	1 0 44	Sept. 7, S. A., 295	Do.
61	11	22	...do	47	70	400	...do	...do	66	...do	9.0	1 1 2	Sept. 7, S. A., 296	Do.
62	11	22	...do	47	70	400	...do	...do	86	...do	11.8	1 0 31	Sept. 7, S. A., 297	Moderately fouled; not leaded by 106 shots.
63	16	22	...do	50	70	400	...do	...do	0	Light from left	11.0	1 1 51	Oct. 3, S. A., 312	Gun not cleaned for next target.
64	16	22	...do	50	70	400	...do	...do	20	...do	10.2	1 1 13	Oct. 3, S. A., 313	Do.
65	16	22	...do	50	70	400	...do	...do	41	...do	11.8	1 1 46	Oct. 3, S. A., 314	Do.
66	16	22	...do	50	70	400	...do	...do	6	...do	10.2	1 0 19	Oct. 3, S. A., 315	Do.
67	16	22	...do	50	70	400	...do	...do	81	...do	9.8	1 1 37	Oct. 3, S. A., 316	Quite clean after 101 shots.
68	17	22	Bottle	51	85	484	1 cannelure	Base	0	Light from right rear.	10.9	1 7 29	Nov. 8, S. A., 346	"Martini-Henry," (English.)
69	17	22	...do	51	85	484	...do	...do	20	Strong from right rear.	9.7	1 5 28	Nov. 8, S. A., 347	Do.
70	17	22	...do	51	85	484	...do	...do	40	Light from right rear.	11.5	1 6 12	Nov. 8, S. A., 348	Do.
71	17	22	...do	51	85	484	...do	...do	61	Strong from right rear.	8.2	1 6 40	Nov. 8, S. A., 349	Do.
72	17	22	...do	51	85	484	...do	...do	81	...do	11.4	1 5 15	Nov. 8, S. A., 350	Quite clean after 101 shots.
73	17	22	...do	51	85	484	...do	...do	0	Calm	7.1	1 7 51	Dec. 2, S. A., 372	"Martini-Henry," (English.)
74	17	22	...do	51	85	484	...do	...do	20	...do	8.5	1 8 18	Dec. 2, S. A., 373	Do.
75	17	22	...do	51	85	484	...do	...do	40	...do	7.8	1 8 53	Dec. 2, S. A., 374	Do.
76	17	22	...do	51	85	484	...do	...do	60	...do	10.6	1 7 48	Dec. 2, S. A., 375	Do.
77	17	22	...do	51	85	484	...do	...do	80	...do	11.5	1 7 54	Dec. 2, S. A., 376	Gun but slightly fouled and not leaded by 100 rounds.
78	16	22	Straight	50	70	400	4 cannelures	In cannelures.	6	Stiff from right rear	11.6	1 4 32	Dec. 5, S. A., 392	Gun not cleaned for next target.
79	16	22	...do	50	70	400	...do	...do	26	...do	13.7	1 4 42	Dec. 5, S. A., 393	Do.
80	16	22	...do	50	70	400	...do	...do	46	Light from right rear.	16.3	1 5 36	Dec. 5, S. A., 394	Do.
81	16	22	...do	50	70	400	...do	...do	66	...do	14.3	1 6 46	Dec. 5, S. A., 395	Do.
82	16	22	...do	50	70	400	...do	...do	86	...do	12.6	1 4 43	Dec. 5, S. A., 396	Slightly fouled and leaded by 106 shots.
83	16	22	...do	58	70	405	5 cannelures	...do	3	Strong from left front; and variable in direction and intensity.	11.4	1 1 33	Dec. 12, S. A., 402	Bullet hardened with 1-12 tin.

84	16	22	...do	58	70	405	.....do	.....do	23	.....do	7.4.....	59 39	Dec. 12, S. A., 403	Do.
85	16	22	...do	58	70	405	.....do	.....do	43	.....do	7.1.....	59 55	Dec. 12, S. A., 404	Do.
86	16	22	...do	58	70	405	.....do	.....do	63	.....do	10.2.....	59 0	Dec. 12, S. A., 405	Do.
87	16	22	...do	58	70	405	.....do	.....do	83	.....do	8.03....	59 46	Dec. 12, S. A., 406	Very clean after 103 shots.
88	16	22	...do	58	70	405	.....do	.....do	0	Calm.....	8.4.....	1 4 5	Dec. 17, S. A., 412	Hardened bullet.
89	16	22	...do	58	70	405	.....do	.....do	21	.....do	8.3.....	1 4 2	Dec. 17, S. A., 413	Do.
90	16	22	...do	58	70	405	.....do	.....do	44	.....do	13.4.....	1 4 58	Dec. 17, S. A., 414	Do.
91	16	22	...do	58	70	405	.....do	.....do	64	.....do	12.8.....	1 4 43	Dec. 17, S. A., 415	Do.
92	16	22	...do	58	70	405	.....do	.....do	84	.....do	11.8.....	1 4 27	Dec. 17, S. A., 416	Gun quite clean after 105 shots.
93	16	22	...do	58	70	405	.....do	.....do	0	Generally from left ...	13.1.....	1 3 5	Dec. 24, S. A., 418	Hardened bullet.
94	16	22	...do	58	70	405	.....do	.....do	20	Very variable in force and direction.	10.9.....	1 2 6	Dec. 24, S. A., 419	Do.
95	16	22	...do	58	70	405	.....do	.....do	40		8.6.....	1 2 33	Dec. 24, S. A., 420	Do.
96	16	22	...do	58	70	405	.....do	.....do	60	From left rear a little steadier.	9.4.....	1 1 56	Dec. 24, S. A., 421	Do.
97	16	22	...do	58	70	405	.....do	.....do	80		9.1.....	1 1 51	Dec. 24, S. A., 422	Very clean after 100 shots.
													1873.	
98	17	22	Bottle ..	51	85	484	1 cannelure	Base.....	0	Strong breeze from left	10.6.....	1 4 18	Jan. 24, F. A., 1370	"Martini-Henry."
99	17	22	...do	51	85	484	.....do	.....do	22	.....do	12.5	1 5 18	Jan. 24, F. A., 1371	Do.
100	17	22	...do	51	85	484	.....do	.....do	42	Strong breeze to F.B. left.	9.5.....	1 5 30	Jan. 24, F. A., 1372	Do.
101	17	22	...do	51	85	484	.....do	.....do	62	.....do	9.6.....	1 3 18	Jan. 24, F. A., 1373	Do.
102	17	22	...do	51	85	484	.....do	.....do	82	Light breeze from left.	8.9.....	1 4 18	Jan. 24, F. A., 1374	"Martini-Henry—7 grs. fouling from 102 shots.

Forty-five caliber at 800 yards—targets of 20 shots. Fired from shoulder and rest.

													1872.	
103	8	18	Straight.	40	70	400	4 cannelures	In cannelures .	0	Brisk from right rear..	24.2.....	2 14 05	Aug. 8, S. A., 263	
104	16	22	...do	50	70	400	.....do	.....do	0	Calm.....	26.5; 1 miss.	2 31 27	Dec. 7, S. A., 398	
105	17	22	Bottle...	51	85	484	1 cannelure	Base.....	0	.....do	24.2; 3 misses.	2 24 39	Dec. 7, S. A., 397	Martini-Henry.
106	17	22	...do	51	85	484	.....do	.....do	0	Light from left rear...	20.5; 1 miss.	2 27 38	Dec. 13, S. A., 408	Do.
107	16	22	Straight	58	70	405	5 cannelures	In cannelures .	0	Light from rear... ...	23.0; 2 misses.	2 27 16	Dec. 13, S. A., 407	Hardened bullet.
													1873.	
108	16	22	...do ...	58	70	405	.....do	.....do	0	Light breeze from left rear.	22.2.....	2 12 30	Jan. 17, S. A., 433	Do.
109	16	22	...do	58	70	405	.....do	.....do	0	.....do	17.3.....	2 14 45	Jan. 17, S. A., 434	Do.
110	16	22	...do	58	70	405	.....do	.....do	0	.....do	19.1.....	2 13 39	Jan. 17, S. A., 435	Do.
111	17	22	Bottle...	51	85	484	1 cannelure	Base.....	0	.....do	19.3; 2 misses.	2 25 45	Jan. 17, S. A., 436	Martini-Henry.
112	17	22	...do	51	85	484	.....do	.....do	0	.....do	19.5; 3 misses.	2 24 59	Jan. 17, S. A., 437	Do.
113	17	22	...do	51	85	484	.....do	.....do	0	.....do	17.1; 2 misses.	2 26 11	Jan. 17, S. A., 438	Do.

TABLE No. 3.—*Forty-five caliber at* 1,050 *yards—targets of* 20 *shots. Fired from shoulder and rest*—Continued.

Number of target.	Gun.			Ammunition.				Lubrication.	Shots since last cleaned.	Wind.	Mean deviation.	Corrected angle.	Date, post, and record number.	Remarks.
	Number.	Twist.	Chamber.	Number.	Weight of powder.	Weight of bullet.	Form of bullet.							
		"			grs.	grs.					"	° ′ ″	1872.	
114	8	18	Straight.	40	70	400	4 cannelures	In cannelures	0	Light from right	57.0	3 21 31	Aug. 22, S. A., 265	
115	16	22	do	58	70	405	5 cannelures	do	0	Calm	35.2	3 34 15	Dec. 16, S. A., 409	Hardened bullet.
116	17	22	Bottle	51	85	484	1 cannelure	Base	0	do	33.7; 5 misses.	3 26 43	Dec. 16, S. A., 417	Martini-Henry.

TABLE No. 4.—*Angles of sight for trajectories obtained by shoulder-firing at each range.*

Ranges, yards.	Corrected angles of sight.						Height of 1,050-yard trajectory in feet at each range.					
	.40″ cal.; gun, 13; am., .46.	.42″ cal.; gun, 15; am., .49.	.45″ cal.; gun, 16; am., .50.	.45″ cal.; gun, 16; am., .58.	.45″ cal.; "Martini-Henry."	.50″ cal.; service.	.40″ cal.; gun, 13; am., .46.	.42″ cal.; gun, 15; am., .49.	.45″ cal.; gun, 16; am., .50.	.45″ cal.; gun, 16; am., .58.	.45″ cal.; "Martini-Henry."	.50″ cal.; service.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	′	′	′	′	′	′
100	2 40	10 6	17 17	14 36	24 30	18 0	15.9	18.0	17.3	16.9	16.9	21.2
200	13 45	21 54	24 6	23 56	27 1	30 0	29.9	34.0	33.4	32.2	33.3	40.6
300	27 8	34 4	38 56	41 29	50 10	48 29	41.3	47.8	46.2	43.7	43.9	56.8
400	37 43	53 32	54 45	52 8	1 7 7	.....	51.4	56.9	56.0	54.5	52.6	.....
500	56 20	1 8 8	1 12 31	1 5 2	1 24 6	1 19 56	56.1	64.7	62.3	62.5	58.4	74.3
600	1 15 26	1 26 23	1 26 23	1 31 41	1 44 21	.....	57.0	68.1	67.4	61.0	59.4	.....
700	1 32 28	1 47 3	1 46 34	1 49 20	2 0 51	2 19 48	56.4	66.8	66.3	60.5	59.2	87.0
800	1 53 8	2 7 43	2 4 4	2 23 8	2 31 16	.....	50.0	61.9	63.6	45.4	46.5	.....
900	2 11 22	2 34 27	2 32 1	2 44 22	2 50 19	3 0 0	42.0	48.6	49.6	34.4	37.3	63.0
1,050	3 4 47	3 36 19	3 35 7	3 28 6	3 37 48	.....	0.0	0.0	0.0	0.0	0.0	0.0

TABLE NO. 5.—*Forty caliber—pressures and velocities—straight chamber.*

Gun.			Ammunition.				Lubrication.	Shots.	Degrees, Benton.	Velocity, feet per second.	Pressure, pounds per □″.	Date, post, and record number.	Remarks.
No.	Twist.	Chamber.	No.	Weight of powder, grains.	Weight of bullet, grains.	Form of bullet.							
	″											1872.	
3	18	Straight ..	46	65	340	5 cannelures	In cannelures.....	1	23.10	1,384.2	18,500	October 10, F. A., 1358.	
3	18	....do	46	65	340	.....do	.....do	2	23.05	1,387.2	25,000	.....do	
3	18	....do	46	65	340	.....do	.....do	3	23.30	1,372.2	19,000	.....do	
3	18	....do	46	65	340	.....do	.....do	4	23.35	1,369.2	19,000	.....do	
3	18	....do	46	65	340	.....do	.....do	5	23.00	1,390.2	20,000	.....do	
3	18	....do	46	65	340	.....do	.....do	6	22.95	1,393.4	22,000	.....do	
3	18	....do	46	65	340	.....do	.....do	7	22.90	1,396.6	21,000	.....do	
3	18	....do	46	65	340	.....do	.....do	8	23.10	1,384.2	17,000	.....do	
3	18	....do	46	65	340	.....do	.....do	9	22.90	1,396.6	17,500	.....do	
3	18	....do	46	65	340	.....do	.....do	10	22.80	1,403.1	20,000	.....do	
Average										*1,387.7	†19,900		
Mean variation in per cent										0.6	8.5		

* 1,434 pounds pressure for every 100 feet velocity.

† 69.7 feet velocity for every 1,000 pounds of pressure.

Forty-two caliber—pressures and velocities—bottle-shaped chambers compared with straight chambers.

STRAIGHT.

Gun.			Ammunition.				Lubrication.	Shots.	Degrees, Benton.	Velocity, feet per second.	Pressure, pounds per □″.	Date, post, and record number.	Remarks.
No.	Twist.	Chamber.	No.	Weight of powder, grains.	Weight of bullet, grains.	Form of bullet.							
	″												
4	18	Straight ..	49	65	370	4 cannelures	In cannelures.....	1	24.00	1,330.6	16,500	October 10, F. A., 1357.	
4	18	....do	49	65	370	.....do	.....do	2	24.10	1,325.1	19,000	.....do	
4	18	....do	49	65	370	.....do	.....do	3	23.80	1,342.4	17,000	.....do	
4	18	....do	49	65	370	.....do	.....do	4	24.00	1,330.6	15,500	.....do	
4	18	....do	49	65	370	.....do	.....do	5	24.80	1,286.6	15,500	.....do	
4	18	....do	49	65	370	.....do	.....do	6	24.70	1,292.1	16,500	.....do	
4	18	....do	49	65	370	.....do	.....do	7	24.30	1,314.1	15,500	.....do	
4	18	....do	49	65	370	.....do	.....do	8	24.30	1,314.1	19,000	.....do	
4	18	....do	49	65	370	.....do	.....do	9	24.70	1,292.1	13,000	.....do	
4	18	....do	49	65	370	.....do	.....do	10	24.60	1,297.6	15,000	.....do	
Average										*1,312.5	†16,250		
Mean variation in per cent										1.25	8.3		

* 1,238 pounds pressure for every 100 feet velocity.

† 80.8 feet velocity for every 1,000 pounds of pressure.

TABLE NO. 5.—*Forty-two caliber—pressures and velocities, &c.*—Continued.

BOTTLE-SHAPED.

Gun.			Ammunition.				Lubrication.	Shots.	Degrees, Benton.	Velocity, feet per second.	Pressure, pounds per □″.	Date, post, and record number.	Remarks.
No.	Twist.	Chamber.	No.	Weight of powder, grains.	Weight of bullet, grains.	Form of bullet.							
	″											1872.	
21	30	Bottle	57	65	370	3 cannelures	In cannelures	1	24.83	1,285.3	17,500	Sept. 27, F. A., 1356	
21	30	do	57	65	370	do	do	2	24.48	1,304.5	17,500	do	
21	30	do	57	65	370	do	do	3	24.43	1,307.3	16,000	do	
21	30	do	57	65	370	do	do	4	24.63	1,296.3	16,500	do	
21	30	do	57	65	370	do	do	5	24.63	1,296.3	17,000	do	
21	30	do	57	65	370	do	do	6	24.58	1,299.0	18,500	do	
21	30	do	57	65	370	do	do	7	24.53	1,301.8	16,000	do	
21	30	do	57	65	370	do	do	8	24.58	1,299.0	15,000	do	
21	30	do	57	65	370	do	do	9	24.98	1,277.0	18,500	do	
21	30	do	57	65	370	do	do	10	25.28	1,261.7	19,000	do	
Average										*1,292.8	†17,150		
Mean variation in per cent										0.84	6.1		

* 1,327 pounds pressure for every 100 feet velocity.

† 75.4 feet velocity for every 1,000 pounds of pressure.

Forty-five caliber—pressures and velocities—bottle-shaped chambers compared with straight chambers.

STRAIGHT.

Gun.			Ammunition.				Lubrication.	Shots.	Degrees, Benton.	Velocity, feet per second.	Pressure, pounds per □″.	Date, post, and record number.	Remarks.
No.	Twist.	Chamber.	No.	Weight of powder, grains.	Weight of bullet, grains.	Form of bullet.							
	″												
8	18	Straight	50	70	400	4 cannelures	In cannelures	1	23.90	1,336.5	17,500	October 10, F. A., 1359.	
8	18	do	50	70	400	do	do	2	24.75	1,289.4	14,000	do	
8	18	do	50	70	400	do	do	3	24.55	1,300.4	15,000	do	
8	18	do	50	70	400	do	do	4	24.70	1,292.1	15,500	do	
8	18	do	50	70	400	do	do	5	24.30	1,314.1	17,500	do	
8	18	do	50	70	400	do	do	6	24.20	1,319.6	19,000	do	
8	18	do	50	70	400	do	do	7	24.70	1,292.1	19,000	do	
8	18	do	50	70	400	do	do	8	24.70	1,292.1	17,500	do	
8	18	do	50	70	400	do	do	9	24.70	1,292.1	15,000	do	
8	18	do	50	70	400	do	do	10	25.05	1,273.2	13,000	do	
Average										*1,300.2	†16,300		
Mean variation in per cent										1.1	11.0		

*1,254 pounds pressure for every 100 feet velocity.

† 79.8 feet velocity for every 1,000 pounds of pressure.

BOTTLE-SHAPED.

Gun.			Ammunition.				Lubrication.	Shots.	Degrees, Benton.	Velocity, feet per second.	Pressure, pounds per □″.	Date, post, and record number.	Remarks.
No.	Twist.	Chamber.	No.	Weight of powder, grains.	Weight of bullet, grains.	Form of bullet.							
	″											1872.	
5	18	Bottle	56	70	400	3 cannelures	In cannelures	1	24.03	1,329.3	21,000	Sept. 27, F. A., 1355	
5	18	....do	56	70	400	....do	....do	2	24.08	1,326.5	19,000	....do	
5	18	....do	56	70	400	....do	....do	3	24.33	1,312.8	18,500	....do	
5	18	....do	56	70	400	....do	....do	4	23.98	1,332.1	20,000	....do	
5	18	....do	56	70	400	....do	....do	5	24.08	1,326.5	18,500	....do	
5	18	....do	56	70	400	....do	....do	6	24.43	1,307.3	17,500	....do	
5	18	....do	56	70	400	....do	....do	7	24.23	1,318.3	15,500	....do	
5	18	....do	56	70	400	....do	....do	8	24.43	1,307.3	19,000	....do	
5	18	....do	56	70	400	....do	....do	9	24.38	1,310.0	17,500	....do	
5	18	....do	56	70	400	....do	....do	10	24.08	1,326.5	18,500	....do	
Average										*1,319.7	†18,500		
Mean variation in per cent										0.65	5.4		

*1,402 pounds pressure for every 100 feet velocity.

† 71.3 feet velocity for every 1,000 pounds of pressure.

TABLE No. 6.—*Penetration in white-pine boards at 500 yards—average of ten shots each.*

No.	Gun.			Ammunition.				Lubrication.	Range, yards.	Penetration, inches.	Date, post, and record number.	Remarks.
	No.	Twist.	Chamber.	No.	Weight of powder, grains.	Weight of bullet, grains.	Form of bullet.					
		″										
1	13	18	Straight	46	65	350	5 cannelures, .02″ deep.	In cannelures	500	8.1		Caliber .40″.
2	15	20	....do	49	65	365	4 cannelures	....do	500	8.6		Caliber .42″.
3	16	22	....do	50	70	400	....do	....do	500	6.8		Caliber .45″.
4	1	42	....do	1	70	450	3 cannelures	....do	500	7.2		Caliber .50″, service.
5	16	22	....do	58	70	405	5 cannelures	....do	500	8.8	December 24, S. A.	Caliber .45″, hardened bullet.
6	17	22	Bottle	51	85	484	1 cannelure	Base	500	11.2	....do	Caliber .45″, Martini-Henry.

APPENDIX B.

REPORT ON RIFLE CALIBERS LESS THAN .50″ WITH BOTTLE-SHAPED CARTRIDGES.

Third report on small-caliber rifled muskets, .45″, .42″, and .50″, made by Lieutenant William Prince, Ordnance Corps, at Frankford Arsenal, Pennsylvania, January, 1872.

FRANKFORD ARSENAL, PENNSYLVANIA,
January 6, 1872.

MAJOR: Conformably with instructions, I have the honor to submit a general resumé of experiments with rifles and ammunition of calibers less than half inch, made at this post up to the present time.

These experiments consist of upward of two hundred targets with calibers .40″, .42″, and .45″, with various weights of charge and bullet, various twists and forms of rifling, and various systems of patching and lubrication.

Many of these experiments have already been the subject of reports, and others had failed to elicit any facts deemed worthy of notice.

Accuracy of flight and flatness of trajectory have been the only qualities tested, other tests being deferred until these conditions were satisfactorily fulfilled.

Up to this time no superiority in accuracy over the present service caliber has been developed, as will be evident from the following tables of results.

The bullets, except where otherwise described, were in all cases cylindro-conoidal, flat fronted, with three *cannelures*, and generally deviating as little from the service bullet as their altered diameters and weight would admit.

The powder is in all cases "musket;" the cartridge-cases all "bottle-shaped."

Forty-five caliber, (0″.45,) 35-*inch twist,* 3 *flat grooves.*

EIGHTY-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.	Mean absolute deviation.	Corrected angle of sight.
	″	′ ″
400-grain bullet, first	6.9	32 54
second	9.3	32 48
Average	8.1	32 51
420-grain bullet, first	9.2	33 36
second	7.8	33 42
Average	8.5	33 39
440-grain bullet, first	9.7	36 54
second	10.9	34 42
Average	10.3	35 48
General average	9.0	34 6

Forty-five caliber, (0″.45,) 35-*inch twist,* 3 *flat grooves*—Continued.

EIGHTY-GRAIN CHARGES—Continued.

FIVE-HUNDRED-YARD PRACTICE.	Mean absolute deviation.	Corrected angle of sight.
	″	° ′ ″
400-grain bullet, first	21.0	1 3 36
second	16.4	1 3 18
Average	18.7	1 3 27
420-grain bullet, first	19.8	1 9 24
second	21.7	1 10 30
Average	20.8	1 9 57
440-grain bullet, first	14.5	1 13 6
second	14.2	1 7 42
Average	14.4	1 10 24
General average	17.9	1 7 56

SEVENTY-FIVE-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.

	″	′ ″
400-grain bullet, first	7.6	32 48
second	7.5	33 30
Average	7.5	33 9
420-grain bullet, first	9.3	34 24
second	5.7	34 00
Average	7.5	34 12
440-grain bullet, first	7.7	35 48
second	7.5	35 48
Average	7.6	35 48
General average	7.5	34 23

FIVE-HUNDRED-YARD PRACTICE.

	″	° ′ ″
400-grain bullet, first	13.2	1 6 36
second	10.5	1 6 12
Average	11.9	1 6 24
420-grain bullet, first	17.5	1 11 24
second	12.6	1 8 54
Average	15.0	1 10 9
440-grain bullet, first	14.4	1 15 42
second	13.5	1 10 18
Average	13.9	1 13 00
General average	13.6	1 9 52

Forty-five caliber, (0″.45,) 35-*inch twist,* 3 *flat grooves*—Continued.

SEVENTY-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.	Mean absolute deviation.	Corrected angle of sight.
	″	′ ″
400-grain bullet, first	7.1	46 42
second	7.9	45 36
Average	7.5	46 9
420-grain bullet, first	7.6	44 48
second	7.9	45 00
Average	7.8	44 54
440-grain bullet, first	8.1	45 18
second	7.9	50 12
Average	8.0	47 45
General average	7.8	46 16

FIVE-HUNDRED-YARD PRACTICE.

	″	° ′ ″
400-grain bullet, first	12.3	1 21 36
second	13.5	1 22 12
Average	12.9	1 21 54
420-grain bullet, first	14.0	1 20 42
second	11.9	1 19 54
Average	13.0	1 20 18
440-grain bullet, first	13.5	1 24 00
second	11.4	1 24 30
Average	12.5	1 24 15
General average	12.8	1 22 9

Forty-five caliber, (0″.45,) 23-*inch twist,* 3 *flat grooves.*

EIGHTY-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.

	″	′ ″
400-grain bullet, first	8.1	31 28
second	8.6	28 35
Average	8.4	30 15
420-grain bullet, first	9.4	29 1
second	10.5	28 1
Average	10.0	28 31
440-grain bullet, first	9.1	33 40
second	8.2	34 49
Average	8.7	34 15
General average	9.0	31 00

Forty-five caliber, (0″.45,) 23-*inch twist,* 3 *flat grooves*—Continued.

EIGHTY-GRAIN CHARGES—Continued.

FIVE-HUNDRED-YARD PRACTICE.	Mean absolute deviation.	Corrected angle of sight.
	″	° ′ ″
400-grain bullet, first	12.7	1 5 52
second	26.3	1 5 8
Average	19.5	1 5 30
420-grain bullet, first	15.7	1 7 2
second	17.3	1 6 11
Average	16.5	1 6 37
440-grain bullet, first	13.3	1 6 52
second	12.7	1 7 24
Average	13.0	1 7 8
General average	16.3	1 16 25

SEVENTY-FIVE-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.

	″	′ ″
400-grain bullet, first	8.4	31 16
second	7.6	34 8
Average	8.0	32 42
420-grain bullet, first	7.4	29 26
second	7.1	31 41
Average	7.2	30 34
440-grain bullet, first	7.9	36 14
second	6.4	34 56
Average	7.1	35 35
General average	7.5	32 57

FIVE-HUNDRED-YARD PRACTICE.

	″	° ′ ″
400-grain bullet, first	15.2	1 8 5
second	9.7	1 6 37
Average	12.5	1 7 21
420-grain bullet, first	13.1	1 7 31
second	14.1	1 8 18
Average	13.6	1 7 55
440-grain bullet, first	10.6	1 8 31
second	10.9	1 6 32
Average	10.8	1 7 32
General average	12.3	1 7 36

Forty-five caliber, (0″.45,) 23-*inch twist,* 7 *ratchet grooves.*

EIGHTY-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.	Mean absolute deviation.	Corrected angle of sight.
	″	′ ″
400-grain bullet	11.1	34 16
420-grain bullet	13.3	35 40
440-grain bullet	12.3	42 1
Average	12.2	37 19

FIVE-HUNDRED-YARD PRACTICE.

	″	° ′ ″
400-grain bullet	16.0	1 11 25
420-grain bullet	23.9	1 11 40
440-grain bullet	16.4	1 10 53
Average	18.8	1 11 59

SEVENTY-FIVE-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.

	″	′ ″
400-grain bullet	9.9	34 40
420-grain bullet	10.3	36 27
440-grain bullet	9.3	36 18
Average	9.8	35 48

FIVE-HUNDRED-YARD PRACTICE.

	″	° ′ ″
400-grain bullet	14.4	1 11 55
420-grain bullet	22.7	1 11 33
440-grain bullet	19.6	1 12 20
Average	18.9	1 11 56

Forty-two caliber, (0″.42,) 30-*inch twist,* 3 *flat grooves.*

EIGHTY-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.

	″	′ ″
350-grain bullet, first	15.7	37 26
second	13.6	31 22
Average	14.7	34 24
370-grain bullet, first	12.6	31 56
second	11.9	33 16
Average	12.3	32 36
385-grain bullet, first	13.8	34 42
second	12.9	34 36
Average	13.4	34 39
General average	13.4	33 53

Forty-two caliber, (0″.42,) 30-inch twist, 3 flat grooves—Continued.

EIGHTY-GRAIN CHARGES—Continued.

FIVE-HUNDRED-YARD PRACTICE.	Mean absolute deviation.	Corrected angle of sight.
	″	° ′ ″
350-grain bullet, first	21.1	1 2 37
second	25.7	1 4 24
Average	23.4	1 3 31
370-grain bullet, first	14.7	1 6 27
second	19.3	1 4 58
Average	17.0	1 5 43
385-grain bullet, first	17.9	1 6 6
second	17.5	1 8 36
Average	23.7	1 7 21
General average	21.4	1 5 32

SEVENTY-FIVE-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.

	″	′ ″
350-grain bullet, first	11.8	38 35
second	10.3	37 42
Average	11.1	38 9
370-grain bullet, first	6.0	36 28
second	8.3	34 55
Average	7.2	35 42
385-grain bullet, first	10.4	36 00
second	9.6	36 36
Average	10.0	36 18
General average	9.4	36 43

FIVE-HUNDRED-YARD PRACTICE.

	″	° ′ ″
350-grain bullet, first	22.0	1 11 38
second	19.5	1 11 40
Average	20.8	1 11 39
370-grain bullet, first	17.0	1 9 58
second	20.6	1 5 5
Average	18.8	1 7 32
385-grain bullet, first	21.9	1 8 24
second	27.8	1 9 6
Average	24.8	1 8 45
General average	21.5	1 9 19

Forty-two caliber, (0″.42,) 30-*inch twist,* 3 *flat grooves*—Continued.

SEVENTY-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.	Mean absolute deviation.	Corrected angle of sight.
	″	′ ″
350-grain bullet, first	9.0	39 45
second	8.4	41 35
Average	8.7	40 40
370-grain bullet, first	10.5	39 42
second	8.3	39 6
Average	9.4	39 24
385-grain bullet, first	6.9	39 42
second	6.7	36 48
Average	6.8	38 15
General average	8.3	39 26

FIVE-HUNDRED-YARD PRACTICE.

	″	° ′ ″
350-grain bullet, first	17.0	1 14 22
second	13.4	1 10 55
Average	15.2	1 12 39
370-grain bullet, first	21.4	1 9 24
second	23.5	1 11 42
Average	22.5	1 10 33
385-grain bullet, first	14.3	1 15 48
second	23.4	1 18 12
Average	18.9	1 17 00
General average	18.9	1 13 24

Forty-two caliber, (0″.42,) 20-*inch twist,* 3 *flat grooves.*

EIGHTY-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.

	″	′ ″
350-grain bullet, first	9.9	32 34
second	10.4	37 11
Average	10.1	34 53
370-grain bullet, first	10.3	35 53
second	10.6	37 14
Average	10.5	36 34
385-grain bullet, first second	26 cases out of 40 burst at extractor seat; quit firing.	
Average	.....	.....
General average	10.3	35 44

Forty-two caliber, (0″.42,) 20-*inch twist,* 3 *flat grooves*—Continued.

EIGHTY-GRAIN CHARGES—Continued.

FIVE-HUNDRED-YARD PRACTICE.	Mean absolute deviation.	Corrected angle of sight.
	″	° ′ ″
350-grain bullet, first	27.9	1 11 35
second	27.3	1 12 53
Average	27.6	1 12 14
370-grain bullet, first	30.5	1 10 19
second	27.3	1 12 50
Average	28.9	1 11 35
385-grain bullet, first / second	Could not use on account of bursting at extractor seat.	
Average	.....	.....
General average	28.3	1 11 55

SEVENTY-FIVE-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.

	″	′ ″
350-grain bullet, first	9.4	36 19
second	7.6	42 16
Average	8.5	39 18
370-grain bullet, first	9.1	37 53
second	7.0	39 29
Average	8.1	38 41
385-grain bullet, first / second	7 cases out of 17 burst at extractor seat—quit firing.	
Average	.....	.....
General average	8.3	39 00

FIVE-HUNDRED-YARD PRACTICE.

	″	° ′ ″
350-grain bullet, first	20.1	1 14 18
second	27.8	1 15 51
Average	23.9	1 15 5
370-grain bullet, first	25.5	1 13 24
second	17.8	1 11 16
Average	21.6	1 12 25
385-grain bullet, first / second	Could not use on account of bursting at extractor seat.	
Average	.....	.....
General average	22.8	1 13 45

Forty-two caliber, (0″.42,) 20-inch twist, 7 ratchet grooves.

EIGHTY-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.	Mean absolute deviation.	Corrected angle of sight.
	″	′ ″
350-grain bullet	12.5	37 31
370-grain bullet	15.0	36 17
385-grain bullet	12.8	39 14
Average	13.5	37 41

FIVE-HUNDRED-YARD PRACTICE.

	″	° ′ ″
350-grain bullet	23.8	1 10 20
370-grain bullet	28.5	1 9 34
385-grain bullet	23.9	1 10 5
Average	25.4	1 7 20

SEVENTY-FIVE-GRAIN CHARGES.

THREE-HUNDRED-YARD PRACTICE.

	″	′ ″
350-grain bullet	11.7	41 25
370-grain bullet	10.5	41 29
385-grain bullet	8.4	40 41
Average	10.2	41 12

FIVE-HUNDRED-YARD PRACTICE.

	″	° ′ ″
350-grain bullet	21.2	1 10 37
370-grain bullet	23.9	1 12 9
385-grain bullet	19.3	1 13 35
Average	21.5	1 12 7

Forty caliber, (0″.40,) 24-inch twist, 5 flat grooves, (smooth cylinder, ellipsoidal patched bullet.)

EIGHTY-GRAIN CHARGES.

FIVE-HUNDRED-YARD PRACTICE.

		″	° ′ ″
350-grain bullet, (Smooth patched,)	first	20.4	1 6 48
	second	23.6	1 7 13
	third	22.2	1 4 43
Average		22.1	1 6 15

SEVENTY-FIVE-GRAIN CHARGES.

FIVE-HUNDRED-YARD PRACTICE.

		″	° ′ ″
350-grain bullet, (Smooth patched,)	first	17.2	1 13 48
	second	19.6	1 9 41
	third	16.8	1 9 40
Average		21.9	1 11 23

Forty caliber, (0″.40,) 18-*inch twist,* 5 *flat grooves.*

EIGHTY-GRAIN CHARGES.

FIVE-HUNDRED-YARD PRACTICE.		Mean absolute deviation.	Corrected angle of sight.
		″	° ′ ″
350-grain bullet, (Smooth patched,)	first	19.8	1 12 3
	second	23.2	1 3 13
	third	21.1	1 2 34
Average		21.4	1 5 27

SEVENTY-FIVE-GRAIN CHARGES.

FIVE-HUNDRED-YARD PRACTICE.

		″	° ′ ″
350-grain bullet. (Smooth patched,)	first	16.0	1 11 57
	second	17.5	1 7 34
	third	14.3	1 3 7
Average		15.9	1 7 33

So far as these experiments go they appear to indicate that—

1st. The .45″ caliber is preferable to less calibers.

2d. The 24″ twist is preferable to 30″ twist for .45″ calibers.

3d. Flat grooving is preferable to ratchet grooving.

4th. The 75-grain charge is preferable to 80 or 70 grains.

5th. The heavier bullets are preferable to the lighter ones.

6. The performance generally is not superior in accuracy to the service-ammunition, caliber .50″, though the flatness of trajectory is, of course, greater for 500 yards, the charge being heavier and the bullet lighter.

The average performance of service-ammunition is, for—

300 yards:	Mean absolute deviation	7″.1
	Angle of sight	49′.0
500 yards:	Mean absolute deviation	13″.1
	Angle of sight	1° 19′

The above facts, however, it must be borne in mind, apply only to the limited number of combinations tried so far among the numberless permutations which may be wrought upon the variables concerned. There may undoubtedly be combinations that will produce results superior in all respects to any so far obtained.

The bullets used in all of these trials, except those with .40″ caliber, were flat fronted and supplied with three *cannelures* for side lubrication, without patch.

It was hoped that the end might be attained, without introducing any of the difficulties and objections incident to patched ammunition.

These difficulties are—1st, that patching the bullet is an operation which it will be scarcely possible to accomplish by machinery; and, 2d, that base lubrication by disks of lubricant and wads involves several operations not required in fabricating the present service-cartridge.

The objections are, 1st, the necessity for dispensing with the indenting of the copper case in the lead of the bullet, which contributes to the water-proof quality of the present service-ammunition; and, 2d, the increased length of cartridge incident to base lubrication.

As, however, many of the most successful systems of metallic ammunition are constructed on these principles, the trials will, unless otherwise directed, be extended over this ground, and cartridges are now being prepared to test the qualities of base lubricated bullets in calibers .50″, .45″, and .42″.

Patched and base lubricated ammunition of .40″ cal. seems to be sufficiently disposed of by the results herein reported.

Respectfully submitted.

WM. PRINCE,
Lieutenant of Ordnance.

Major T. J. TREADWELL,
Ordnance Department, Commanding.

FRANKFORD ARSENAL, PENNSYLVANIA,
January, 1872.

Respectfully forwarded to the Chief of Ordnance for his information.

T. J. TREADWELL,
Major of Ordnance, Commanding.

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GENERAL INDEX.

ADDENDA.

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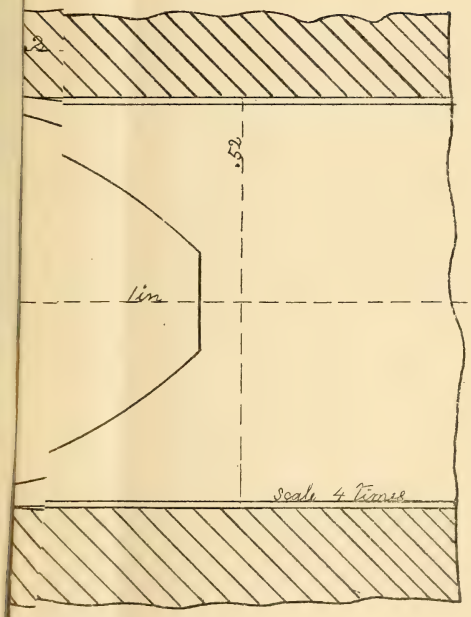
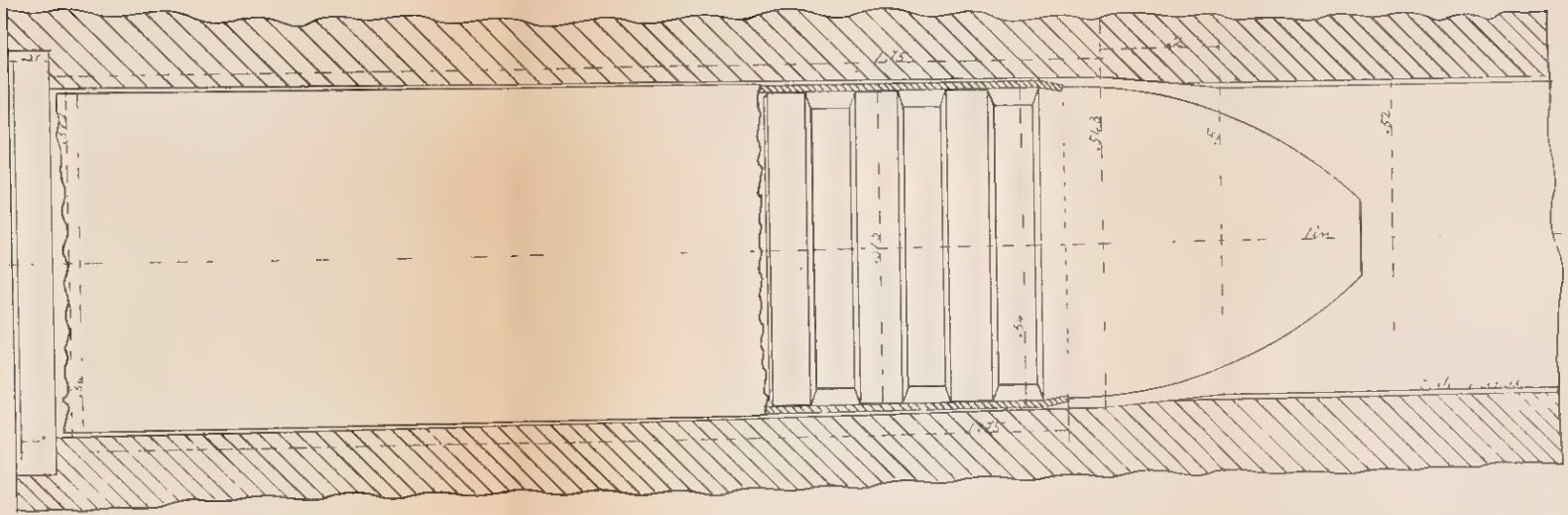


"Proceedings of the
Calibre Board"
Wm Prince Sr Esq
Recorder

Fig 1 – Chamber of Gun No 1
Ammunition of No 1 in position



Appendix A – According to the
Single Gun Carriage
for Gun No
Foot

Frankford Arsenal
July 1872

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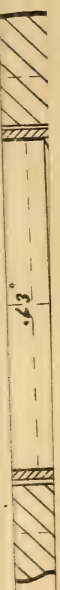
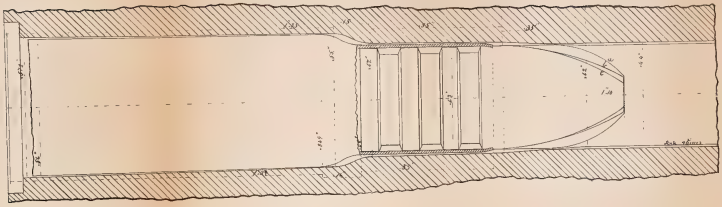


Fig 2 - Chamber of Gun No 2
Ammunition No 25 in position (1)

Appendix "A" Proceedings of the
Small Arm Calibre Board"
Wm Prince Lt Ord.
Recorder



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GTON, D C.

Fig 3 – Chamber of Gun No. 2
Ammunition No. 2 in position (a)

Approved H. M. Inspector of the Small Arms Cartridge
Approved Wm. Pleasants Lt. Col. Ordnance

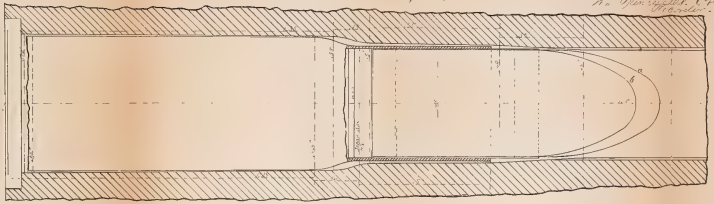
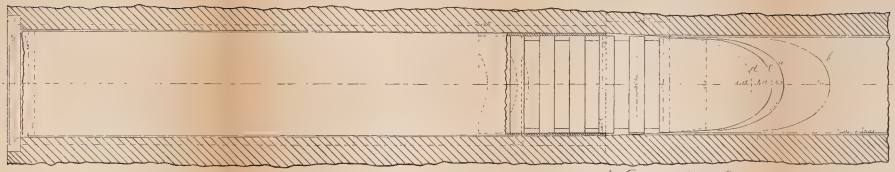


Fig 4 – Chamber of Gun No 3
Cartridges Nos 2. 3. 4. 5. 6. 7. 8. 9 in position (a) – No 10 (b)
Nos 11. 12. 13. 14. 15. 16. 17. 18. 19 ~~20~~ (c) – No 24 (d)



Appendix A. Proceedings of the
Small Arms Calibre Committee
Sir J. Inglis
Illustration

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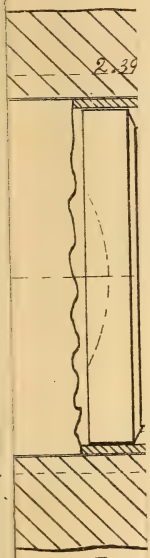

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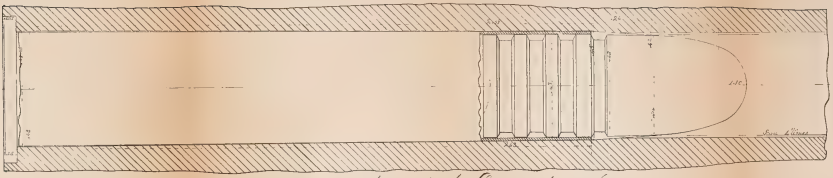
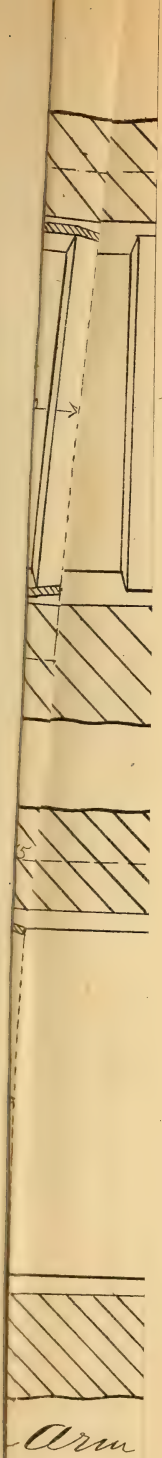
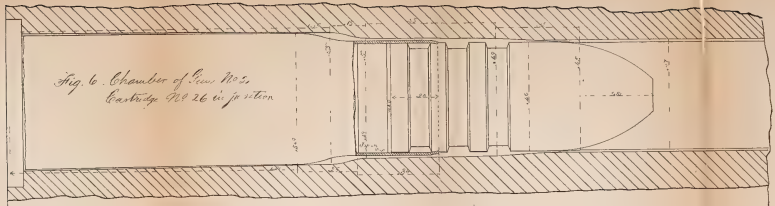
Fig 5 – Chamber of Gun No 4
Lower tier No 20. 21. 22 & 23 in position.

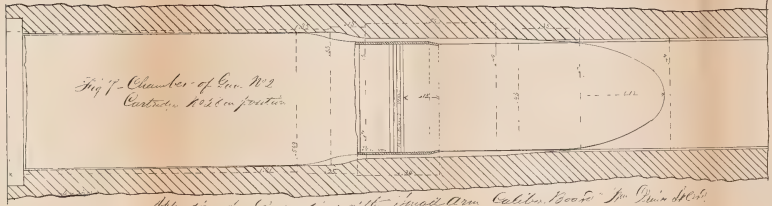


Appendix A. Operations of the
Ordnance Corps Calibre Board
by Lieut. Colonel
Rhoades



D C.





Appendix A — Proceedings of the Small Arm Cartridge Board, San Francisco, Inventor

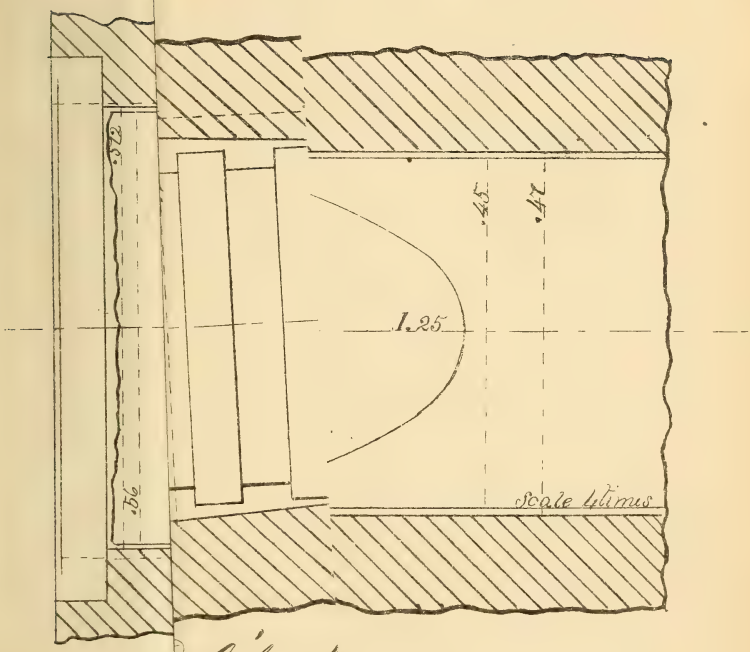


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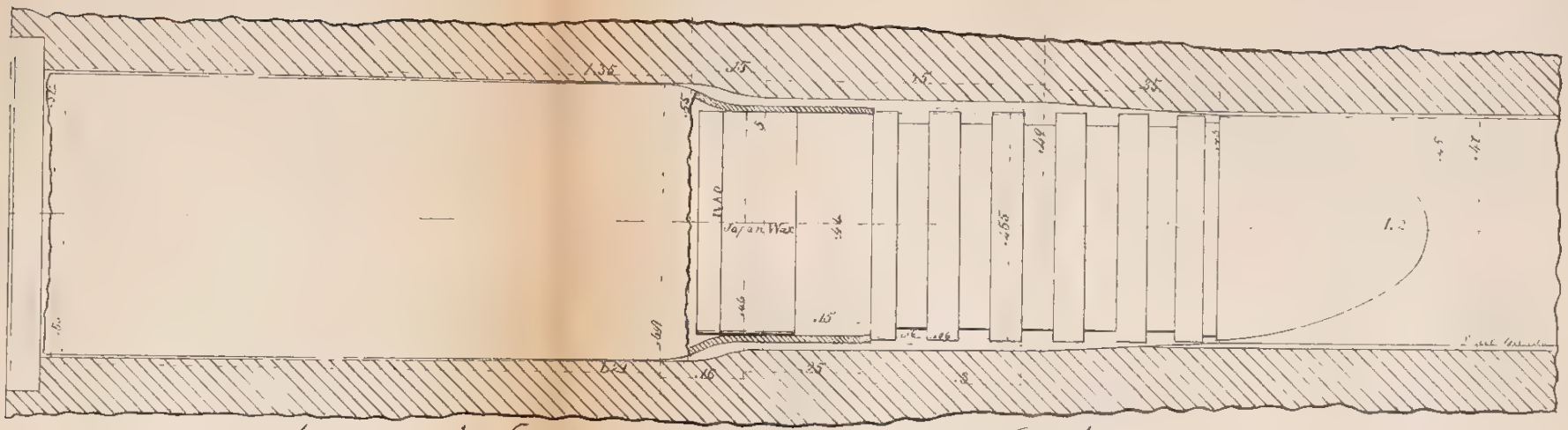
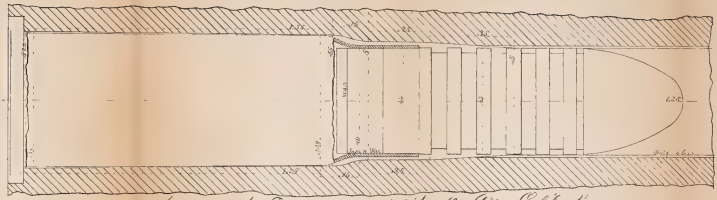
Fig 8 – Chamber of Gun No 2
Cartridge No 29 in position and No 30 (explosive) in Recess K


Japan Wax
See Drawing

Facsimile of Drawings of the Twelve Gun Calibre Rear
Gun Chamber & Breech
Recorded

Fig 9 Chambering Gun No 5
Cartridge No 39 in position.



Appendix A. Proceedings with Small Arms Committee
Ypres Ordnance Factory
Kerchi

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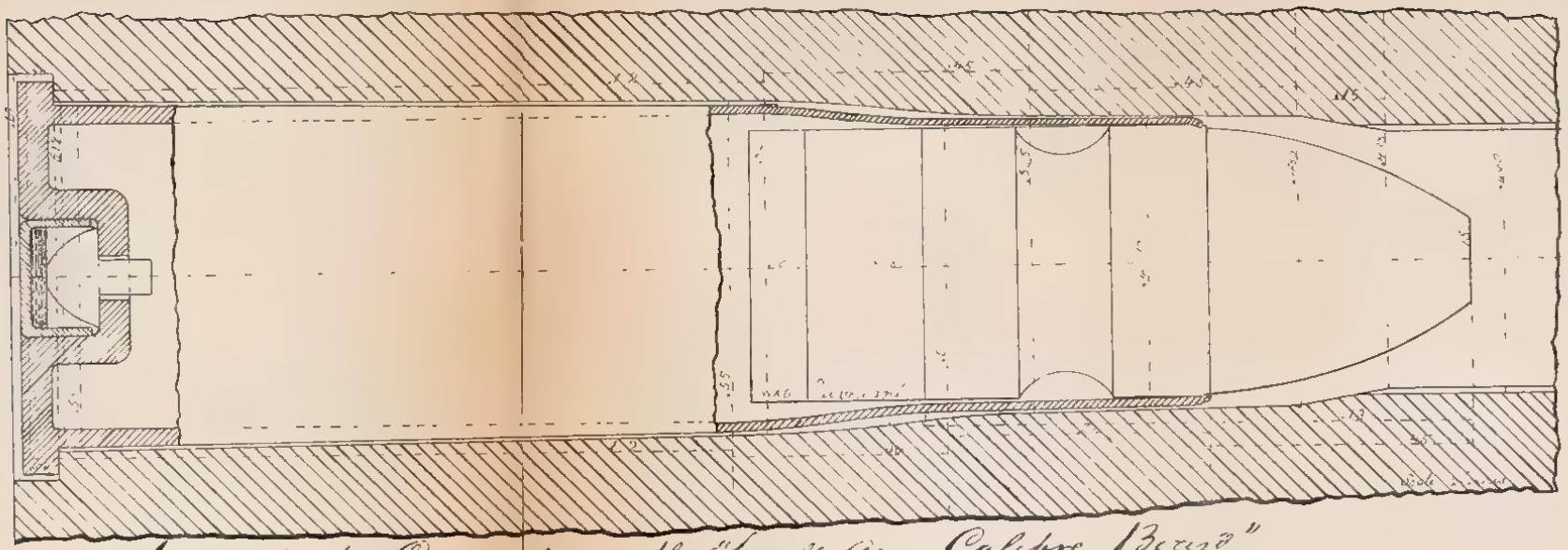
Corder

Fig 10 – Chamber of Gun No 6
Cartridge No 31 in position.



Appendix A – Proceedings of the "Small Arm Calibre 1 Bore"
Wm Driver – Lt Ord Recorder

R. PETERS PRINTING & LITHOGRAPHING WASHINGTON, D.C.

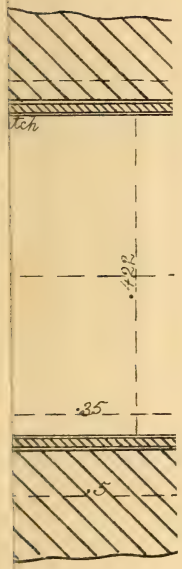


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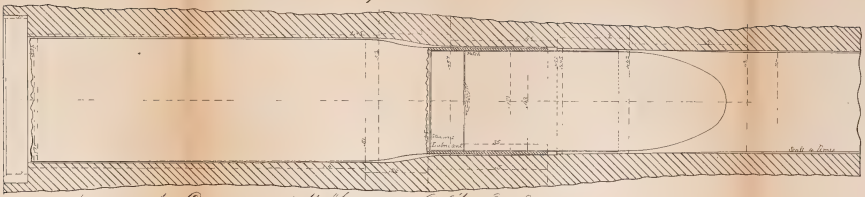
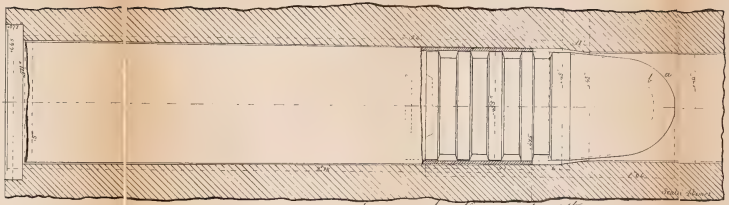
Fig 11 – Chamber of Gun No 7
Cartridge No 32 in position



Appendix A – Proceedings of the Small Arms Committee 1873 and
Mr Owen's Col Recorder

Fig 12 – Chamber of Gun No 8
Ammunition Nos 39, 40, 41, 42 & 45 in position (a)
— do — — No 47 in position b



Appendix A – Proceedings of the
Small Arm Caliber Board
Wm Prince 2d Lt – Recorder

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

Fig. 1.

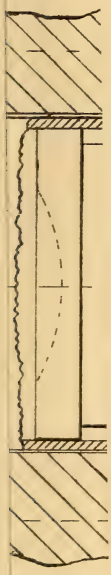


Fig. 2
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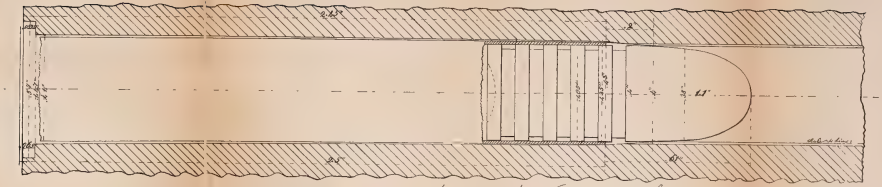
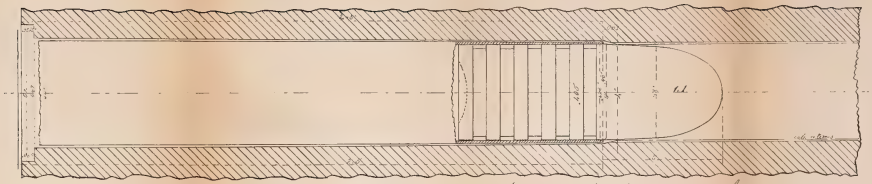
Fig 13 – Chamber of Gun No 114
Cartridge No 118 in position



Appending A – Proceedings of the
"Small Arm Calibre Board"
Wm Prince Lt. Ord – Recorder

Fig 14 - Chamber of Gun No 13
59,60
Cartridge No 46 in position

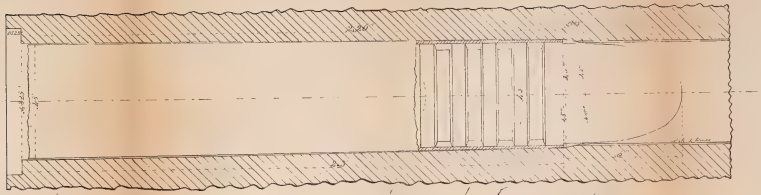


Appendix A - Proceedings of the
"Small Arms Calibre Board"
Capt. Prince Ord. - Recorder

A. FIELD, PRIN., WOLVERHAMPTON

TON

Fig 15 – Gen. No 15
54,55
Cont. fig. No 49 – in position



Appl. dim. to Fumaiuolo of the
[illegible] Cylinder [illegible]
Dr. Fr. Gf. Ross. Newcastle

No 16

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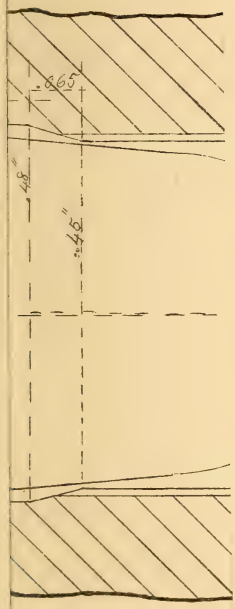

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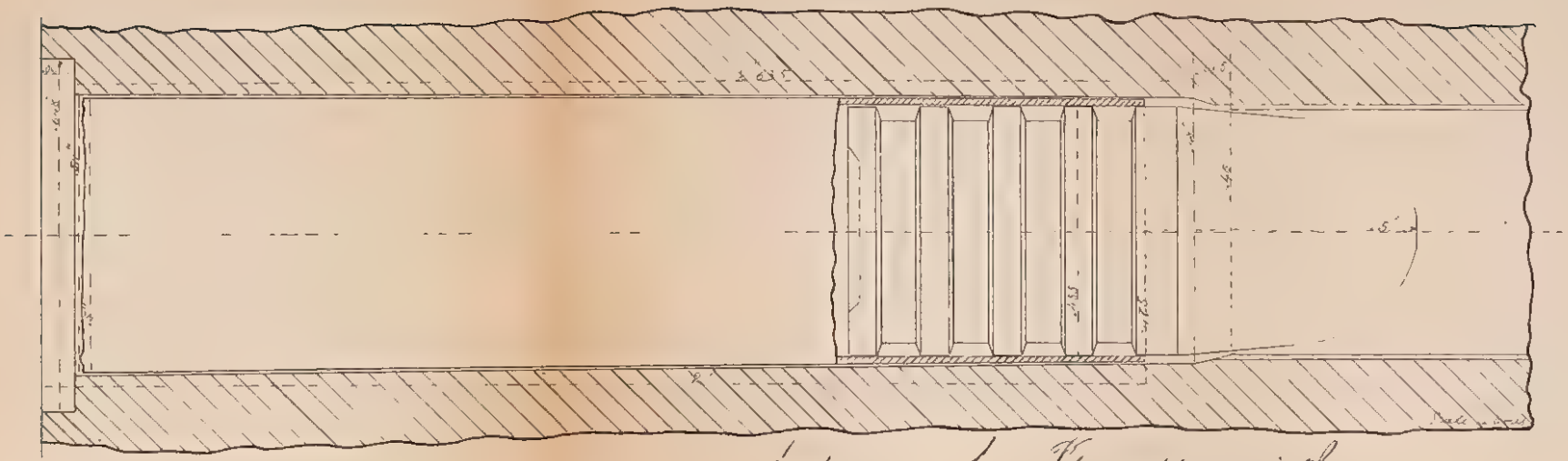
Board"
Lt Ord

Fig. 16 – Chamber of Gun No. 16
Cartridge No. 50 in position



Appendix 4 – Proceedings of the
Small Arms Caliber Board"
Wm. Prince Lt Col. Recorder

WILLIAM BEACH TOLTON, PRINTER, WASHINGTON, D.C.

No 16

in position

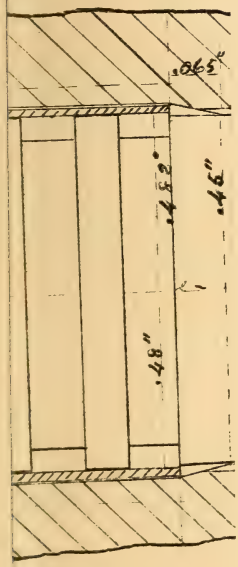


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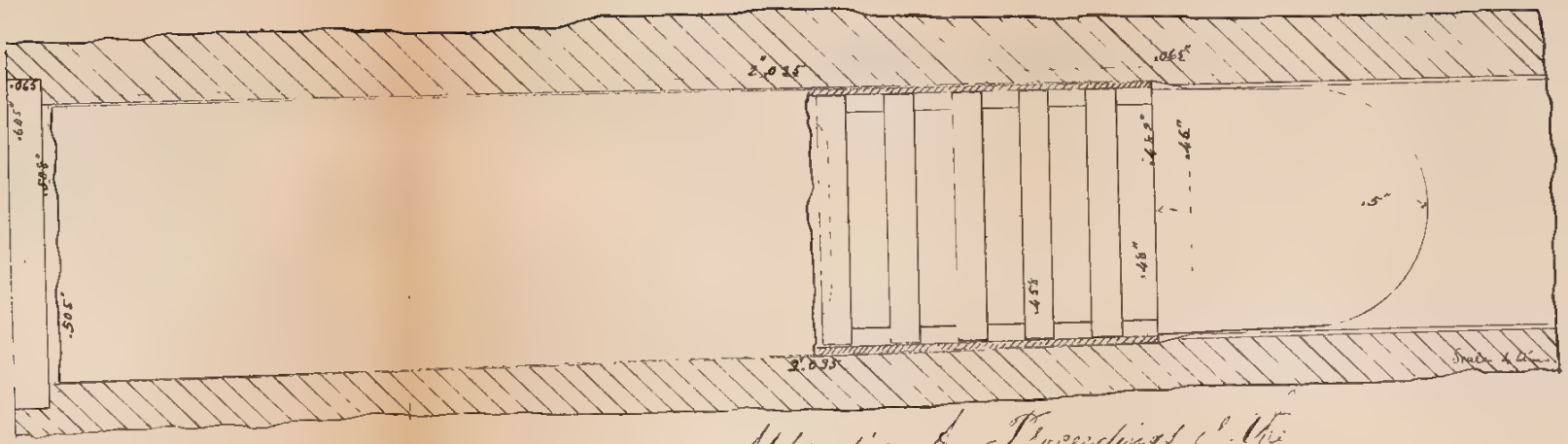
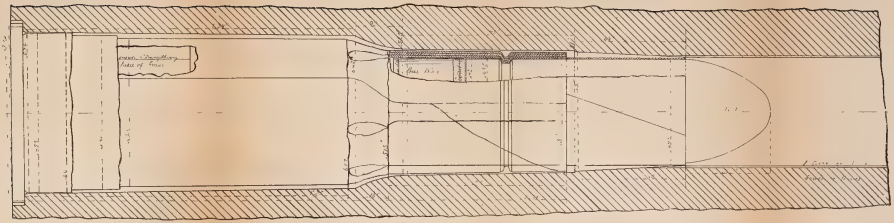
Fig 17 – Gun No 16
Cartridge No. 58 in position

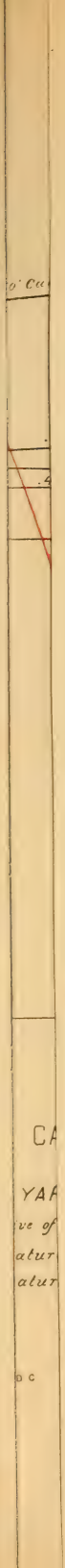


Appendix A – Proceedings of the
"Small Arms Calibre Board"
Wm Flowers Lt Col – Recorder

Fig 18. Gun No 17
Cartridge No 5 in position



Approved A. Chowdhry & Co
Lt Col Ord Cantn Meerut
Wm. Jones Lt Col Ord Agent



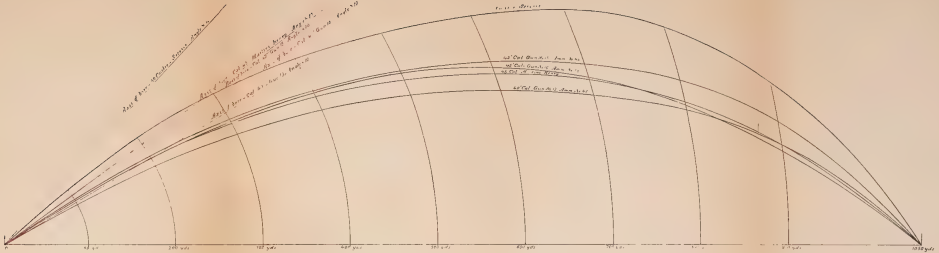


Fig 9 REPORT OF SMALL-ARM CALIBRE BOARD

TRAJECTORIES at 1050 YARDS

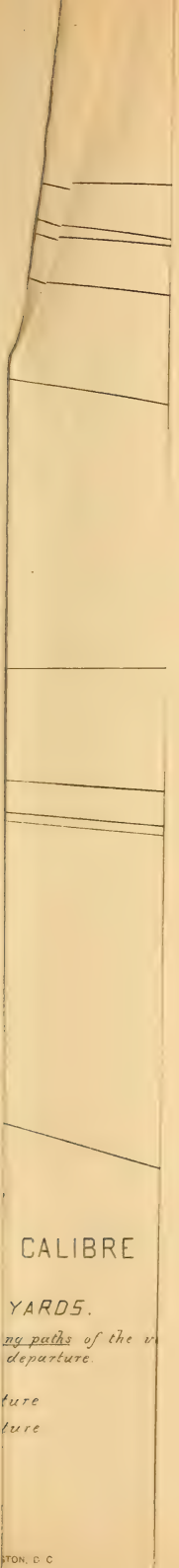
Projected to exhibit the relative flatness or superiority of the displayed dispersions

Horizontal Scale 1/36 nature

Vertical Scale 1/8 nature

W. PRINCE BROWN
RECORDER

W. PETERS, PRINTER, WASHINGTON, D.C.


CALIBRE
YARDS.
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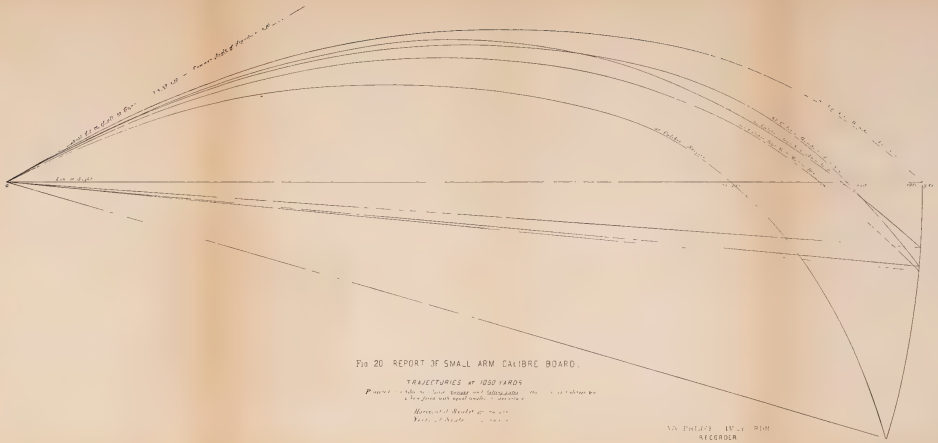

Fig 20 REPORT OF SMALL ARM CALIBRE BOARD.

TRAJECTORIES AT 1050 YARDS

Powder [illegible] Lead bullet [illegible]

Barrel fixed with equal angle [illegible]

Horizontal Range [illegible]

Point of Aim [illegible]

VIA PHILIPS WILL PRINT RECORDER

un 13.– Amm.

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Fig 21 REPORT OF SMALL-ARM CALIBRE BOARD

TRAJECTORIES AT 500 YARDS

Projected to exhibit the relative Horizontal components of their Angles of departure

Horizontal Scale $\frac{1}{500}$ *nature*

Vertical Scale $\frac{1}{50}$ *nature*

Wm PRINCE, 1st Lt ORDN
RECORDER

W. PETTIE, PRINTER, TORONTO, ONTARIO.

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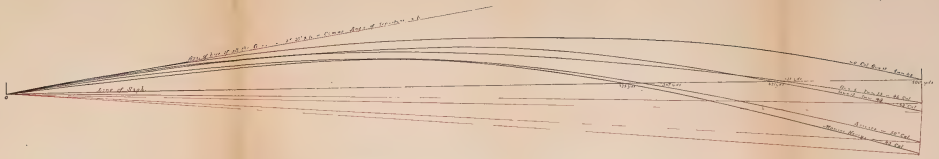


Fig. 22 REPORT OF SMALL-ARM CALIBRE BOARD

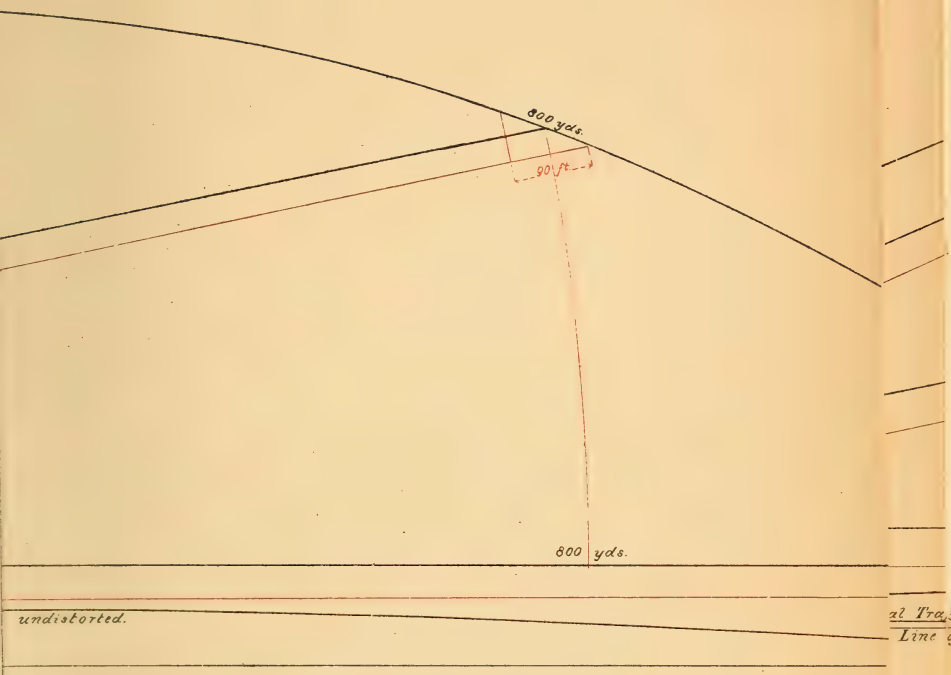
TRAJECTORIES AT 500 YARDS

Projected to show the comparative range and flatness paths of the various Calibres, when fired with equal angles of departure.

Horizontal Scale $\frac{1}{20}$ *nature*
Vertical Scale $\frac{1}{10}$ *nature*

Wm PRINCE, 1st Lt ORDN
RECORDER

GPO 1875-1 WASHINGTON, D.C.



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Nº 58.– 45" CALIBRE.

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Wm. PRINCE, 1st Lt. OR
RECORDER.

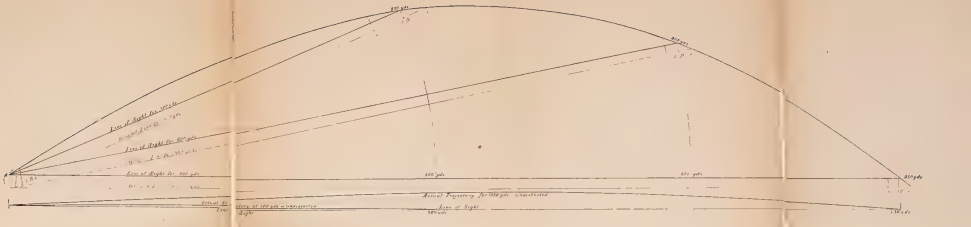

Fig 23 REPORT OF SMALL ARM CALIBRE BOARD

1888 YARDS TRAJECTORY OF GUN No 16 with AMMUNITION No 58 – 45 CALIBRE

Showing the Trajectories for velocity of 100, 200 and 300 yards.
On the assumption that a ball is fired 18 inches from the ground and the point aimed at is 18 inches from the view.

Horizontal Scale (Derived from A) 1/20 nature
Vertical Scale (exaggerated to assist) 1/5 nature

These distortions reduce the trajectory in the same ratio as the whole

Wm FRENCH Sgt Major
RECORDER

WITTON PRINTING WORKS, WINCHESTER.